40p EVERY WEEK · No 81 · OCT 6 1984

PERSONAL Computer NEWS

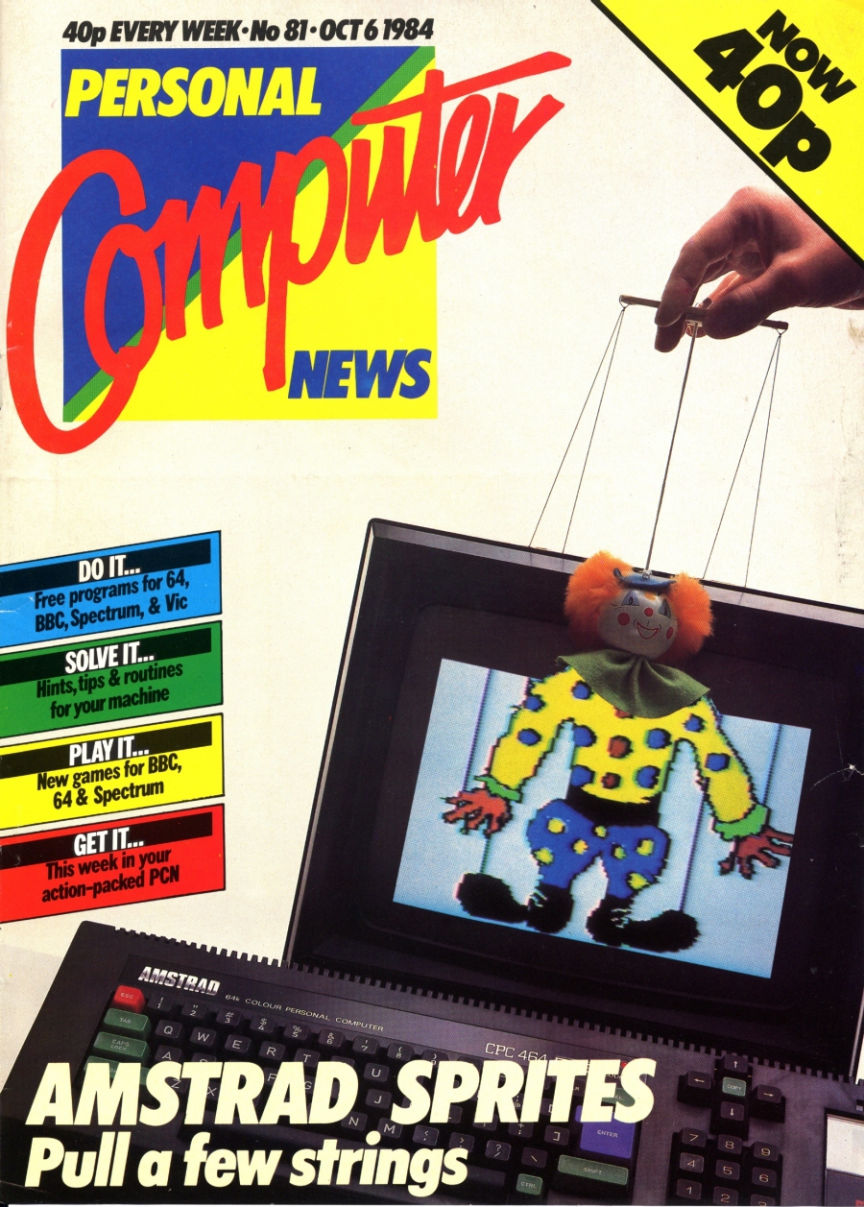
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Free programs for 64, BBC, Spectrum, & Vic

SOLVE IT...
Hints, tips & routines for your machine

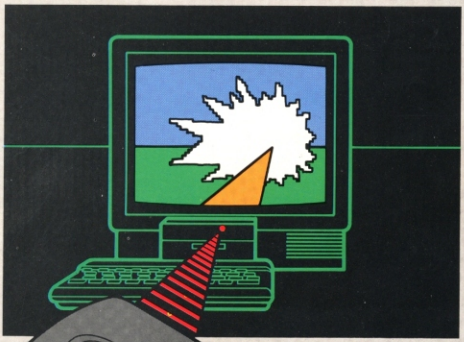
PLAY IT...
New games for BBC, 64 & Spectrum

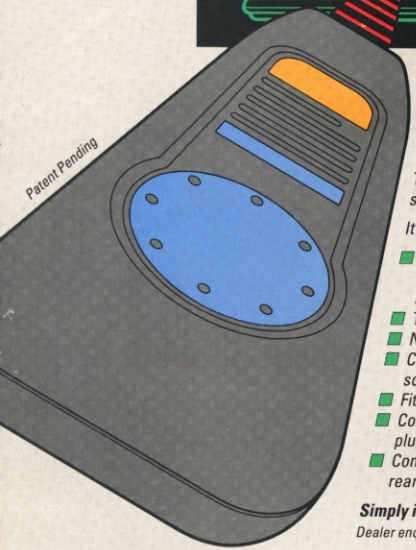
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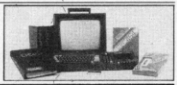
Cheetah Marketing

MENU

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Spritely Amstrad 24

A special feature for an up-and-coming new micro. Keith Hook teaches you how to manoeuvre sprites on an Amstrad screen.



OUTPUT

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If you have any ailing scratched disks this program could be just what the doctor ordered.

BBC tells time 17

Wall clocks are passé. What you want is a clock on your micro's screen — preferably one that works.

Game generators 18

Does the idea of writing your own games sound interesting? Well, if you own a Spectrum there's plenty of packages available to help.

Vic 20 Picture Pro 22

The humble Vic is capable of quite impressive block graphics, as this program by John Ingham shows.

HARDWARE

Olivetti on the move 26

The reigning 'most stylish micro on a desktop' is now available in portable form, complete with IBMulation.

PERIPHERALS

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Cheetah is trying to put joysticks on the scrapheap with an infra-red games controller — but is it a viable alternative?

Flexible friend 36

Graphics of a very high standard can be produced on a Commodore 64 using the powerful software and lightpen combined in Flexidraw.

SOFTWARE

Spectrum Express 42

The trans-Spectrum express has arrived — an ingenious piece of software that allows programs to be transferred from Microdrive to tape and vice-versa.

Gameplay 45

Avalon on the Spectrum is the big winner this week, and more fun is in store for BBC and Commodore 64 owners.

REGULARS

Monitor 1

Whose head on the block on bulletin boards? this page; Boots in a minor panic, page 2; Spectravideo owners on a limb, page 3; and Oric unveils its modem, page 4.

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Enter the games arena or chart the successes of your favourite micro. Even Radio 1 is tuning in.

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A massive selection of new software titles have landed in our office this week and are introduced here.

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Quit/Datelines 56

The results of the laughline competition and much, much more.

MONITOR

Wherever it happens, if it affects you, we report it in the Monitor pages. Home news, events and analyses, with regular columns from where technology makes waves — the USA and Japan. Plus a regular look at the British micro scene in Home Front.

Compunet users are liable

If something appears on a bulletin board that is illegal, libellous or offensive who carries the can — the bulletin board operator or the person who uploads the information?

No argument, says Compunet (the new dial-up database for Commodore 64 users), it is the person who uploads the information. And that could be you.

Compunet has scored over its rival Micronet by running an area on the database called the Jungle. For a charge of 1p a day per page, you can upload anything you like to be read by any other user.

'If we find anything that is illegal or offensive we would, of course, take it off,' said John Clarke, Compunet's commercial manager. 'But we can't exercise any editorial control over what people choose to put up.'

To get itself off the hook in any legal actions, it has written in to the terms and conditions of usage a requirement that users accept legal responsibility for anything they upload.

Mr Clarke said that the clause had been inserted after taking legal advice from its solicitors and Compunet is confident that this will protect it from anyone wanting to sue.

But the company admits that the legal position is still unclear. 'The advice from our solicitors is that this is such a new area that there are no legal precedents to follow,' said Mr Clarke.

In conventional publishing material is checked before it goes into a magazine or newspaper. With electronic publishing, the material is loaded directly in to the database by the user without the publisher seeing it first.

The question of legal responsibility is one that is not only worrying Compunet. Operators of bulletin boards in this country are anxiously following a legal action currently going through the courts in the US.

In Los Angeles a bulletin board operator had all his equipment seized after a caller had left a list of telephone credit card numbers on a public area of the board.

The equipment was subsequently returned but the operator is now being taken to court.

● Compunet has already signed up its first information provider. National Property Link is running a nationwide property information service for estate agents. For £1,200 or £40 a month, an estate agent gets a Commodore 64, two disk drives, monitor, printer and modem. The software included allows access to Compunet and the ability to operate a local property matching service. Details on many of the properties available can be accessed by other Compunet users.



Compunet —Jungle in a legal tangle.

Lynx could become extinct

That endangered species, the Lynx, now looks certain to go the way of the dodo and the dinosaur.

A last gasp international rescue attempt in the shape of Spicers, the paper and stationery giant, has fallen through and liquidator Hacker Young has given the Lynx just a month to live.

'The purchaser who showed a more than strong interest since July has dropped out officially,' said a spokesman for Hacker Young.

'There is still some interest being shown but there is not very much time left. Within a month someone will have to be found to continue with the project or it will have to be broken up and the parts sold off.'

Sticking in the Boots

What with all this talk about software piracy, we're in danger of overlooking a more insidious threat to freedom — software censorship.

You may recall that *Ship of Doom* caused a bit of a rumpus because of some of its language, or at least the way it responded to a certain verb-noun combination. Since then there's been very little in the way of heavy-handed puritanism, with the exception of some worry over *The Evil Dead*, which didn't turn out to be the first micro-nasty.

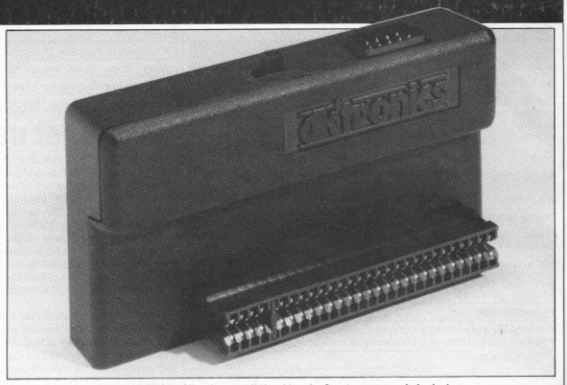
Now, from an unlikely quarter, the red pen has struck — and on a chart game, too. Boots the Chemists, the Marks and Spencers of toiletries and well-known bastion of clean living, has decided not to stock *Wanted: Monty Mole*. A spokesperson told *PCN* 'We've decided not to sell it. There are some odd overtones and we felt it wouldn't be appropriate.' The game contains some obscure references to one King Arthur (he of the NUM round table) and Boots apparently doesn't want anything even vaguely political on its shelves. It is based, remember, in Nottingham.

WH Smith is also not stocking it, but a spokesman had trouble saying why. At first, we were told that WH Smith operates a very selective system for purchasing software, and because of the lack of shelf-space, Monty Mole just didn't get chosen. When pressed, the spokeperson said: 'Yes, well, you could say it's not up to standard.' Later, we were told that the game was considered to be too similar to the (Spectrum) games *Jet Set Willy* and *Manic Miner* — it wasn't original enough.

Curious, considering Monty Mole has been our number one game and still holds the number two spot. Then again, WH Smith has only just started to carry Sinclair's Match Point — it's number one in the company's charts this week. The game was released way back in July and has since dropped to the bottom end of everyone else's charts, in favour of games like *Monty Mole*.

Boots and WH Smith are putting themselves in the same ridiculous position as Radio 1 which occasionally bans records considered 'offensive'.

Can we look forward to the more moral retailers not carrying titles like *Jet Set Willy*, *Strip Poker*, *Suicide Express*, *Pi-eyed* et al?



FLEXIBLE STICK — Here's a neat little add-on for Spectrum users who've had no joy with joysticks. The programmable joystick interface from DK 'Tronics (0799-26350) costs £22.95. It comes with machine code software and can be programmed to give full eight-direction joystick movement. In addition, it accepts any Atari/Quickshot type joystick — and the through connector enables other add-ons to be plugged into the rear.

Microdrives for Black Magic box

There's never a dull moment for Sinclair where the QL is concerned.

As though to make up for the delays with the machine itself, Sinclair has produced additional Microdrives well before it said it would. About 18 months in advance, to be precise.

Why? The rumours are true: Spectrum Microdrives will work with the Black Magic box. The only problem is that everything is the wrong way round.

But that is easily remedied. Simply take the cover from the right hand side of the QL, position the Microdrive so that its socket faces to the left (towards the QL), and connect the ribbon cable without a twist between the twain. This gives you the additional MDV3.

The procedure for accessing the extra drive is exactly the same as for the two built-in units, except that you'll need to use the '3 (suffix. You may also have to format the cartridge in drive three and wiggle the QL's end of the connection a little, but once it's in it works just as well (or as badly, as the case may be) as the other drives.

Lore and Profits

In a year that has seen the collapse of companies like Dragon, Camputers, Newbrain, Tycom and others — it's refreshing to hear that some British companies are able to hold their own in the cut throat business of microcomputers.

Britain's two main micro giants, Acorn and Sinclair, have both had financially successful years. Within days of each other they both announced profits of more than £4 million.

Acorn came out on top with its sales doubled at £93 million, and profits of £4.4 million. Sinclair's profits — £7.8 million — were larger as a proportion of its sales — £77.7 million — but last year they'd been higher at £8.3 million.

Both companies admitted they'd had their problems during the year. Chris Curry said that Acorn's start-up costs overseas (especially in the US) and lower sales there than it had expected, had affected its figures.

Meanwhile Sir Clive's black clouds were the development costs of the QL and the flat-screen TV. The silver lining was that by the end of the financial year (in March) it was £1.7 million to the good through QL orders.

For companies that have grown rich on home micros both Acorn and Sinclair will depend to a great extent on business machines for another good year. You can draw your own conclusions from that.

Stars of show

Here's the moment that all *PCW* show-goers have been waiting for.

The PCN stand was the scene of frantic activity throughout the show as every would-be assassin tried their hand at the PCN game. On offer were daily prizes of Prism modems, Moveits, and an Amstrad with colour monitor.

Winner of the Amstrad, with a four-day high score of 254 points was M Robinson, of Hornchurch, Essex. Modem winners were Stephen Randall, of Portsmouth; John Cox, of Shepperton, Middx; and Chris Ryan, of Queen's Square. If Chris would like to send us his full address we'll send him his prize.

Runners-up were S. Fonceca, of Horsmonden, Kent; C Driscoll, of Gants Hill, Essex; M Zinkin, of London N7; and S Patel, London NW10.

In a separate competition we also gave a free year's subscription to PCN to five winners.



MONITOR

Spectravideo flounders over upgrade for 'MSX-compatible' machines

It looks as though the launch of the MSX Spectravideo 728 (issue 80) might just leave owners of the earlier 318 and 328 out in the cold.

These machines were originally advertised in this country as MSX compatible, but turned out not to be around the beginning of this year.

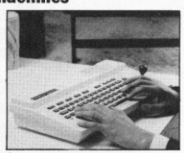
Aggrieved customers were placated at the time with the prospect of an MSX adaptor for the Spectravideo — this was 'coming soon' and would be priced at around £30.

Obviously there's little need for an MSX adaptor when there's no MSX, but with the real thing just starting to hit the streets you'd expect to be able to get the adaptor, right? Wrong.

A source at Spectravideo UK didn't exactly inspire confidence. It wasn't certain how much the adaptor would cost, what it would look like, and when it would arrive. Spectravideo Hong Kong had told the UK arm that it was undergoing design, but staff in this country weren't sure that it would ever appear at all.

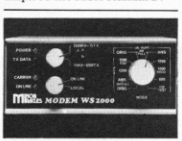
Perplexingly, it seems that although the company isn't sure what support it can give to existing users, or when, the truly MSX 728 is confidently expected by mid-October.

It's also intended to carry on selling the 318 and 328 as seperate machines, on the grounds that 'they've got a better Basic than MSX'. So if the adaptor ever arrives we suppose it'll be called the 'MSX downgrade'.



Spectravideo's 318 — high and dry.

In the light of the sticky position of the almost-but-not-quite-and-maybe-never-to-be MSX 318 and 328, PCN's juxtapositions department was intrigued to read Spectravideo's brochure for the 728. 'Spectravideo — the company that inspired the MSX standard'.



Miraculous — BABT approval.

Miracle wins BABT modem approval

Miracle Technology, one victim of the slow approval procedure for modems (issue 52), has finally won British Telecom's coveted 'green blob' for the WS2000 world modem.

The only change the company has had to make to secure approval is to disable the selection of Bell frequencies. Apparently, one tone originally used can confuse some UK telephone exchanges into thinking that the caller has hung up.

Miracle Technology has already started to ship modems bearing the green blob and if you want one phone (0473) 50304 for further details.

Tandata (06845 68421) has also won official approval for its £217 Tm200 modem with 300/300 full duplex operation. Anybody who ordered the stop-gap Tm120, superseded by the Tm200, will get the 200 at no extra cost.

Media-makers on MSX track

At last, from the mystical distant east, comes a new type computer storage — the Quick Disk Drive, from Mitsumi Components. It consists of a single 2.8in disk and boasts large memory with an unformatted capacity of 64K per side on a single track.

This track, like that of a record, is set out as a spiral and, according to the documentation, is a 'new type of memory unit with high speed aspect of floppy and economical aspect of cassette'.

IN BRIEF

Three of a kind Quicksilva, BugByte and Virgin Games have joined up with CBS in a joint marketing operation called Software Sales Service.

What this should mean is that any major game produced by any one of the quartet — CBS's first games are due in November — will usually be in ample supply. But Geoff Thompson, national sales manager, said: 'It's not by any stretch of the imagination a merger.'

The Linkword language learning software will shortly be available for Amstrad and QL users.

Protek, of modem fame, expects to have the basic Linkword software out by Christmas. In the new year it will follow this up with an extension of the scheme to take you to O Level standard.

Tandy's determination to move away from its hobbyist image was underlined last week when it launched a second IBM-compatible micro in the US.

The Model 1200 takes on IBM's hard disk XT, and will cost $3,000. It uses the 8088 processor.

The Talkies come to town with a series of launches from Tymac (01-643 8899). Tymac's games, for Commodore and Atari machines, include speech without synthesis.

The first titles (Gandalf, Pegasus and the Trials of Perseus, Samurai, Bio-Defense and First Strike) cost £9.95 on tape and £14.95 on disk.

HOME FRONT

Atari slugs it out with Commodore

The gloves are now well and truly off as Atari and Commodore slug it out in their Wild West showdown.

When the dust settles — some time next year — the micro market will look vastly different from its present layout.

The prize they are fighting over is to corner the market in the next generation of home computers based on 16-bit and 32-bit processors.

Atari has drawn first blood by slashing the price of the 800XL micro first to £199.99 and now to £169.99 in an attempt to undermine Christmas sales of the Commodore 64 and generate some cash for its next leap forward.

Sam Tramiel, son of Atari boss Jack Tramiel, has indicated in an interview that Atari will launch a 32-bit micro next April costing under $1,000.

Industry observers on the other side of the Atlantic are saying that Atari has an agreement to use Motorola's 68000 chip and that Tramiel's intention is to produce a Macintosh-like machine.

It will probably feature a 256K memory, dramatic full-colour graphics and impressive sound features.

The formula sounds very similar to the Lorraine, an innovative home micro being developed by an American company called Amiga that has just been bought by Commodore.

The similarity is more than coincidence. Atari had paid Amiga to develop custom sound and graphics chips for its next generation of machines before Tramiel took over Atari.

Amiga subsequently returned the money saying that it had been unable to develop the chips. Atari responded by suing Amiga a matter of days before news leaked out that Commodore had bought the company.

The specification of the Amiga Lorraine is certainly impressive and was demonstrated to a selected few at the *Consumer Electronics* Show in Chicago in June.

Built around a 68000 chip it features 128K of RAM (expandable internally to 512K), 64K ROM holding Basic and speech software, built-in 320K disk drive, built-in 300 baud modem, parallel and serial interfaces, expansion port and ROM cartridge slot capable of taking second processors.

The four channel sound is said to be every bit as good as that on the Commodore 64.

But it is the graphics that are truly impressive.

The custom chip in the Lorraine can display a total of 4,096 colours at a resolution of 640 by 200 pixels. It can generate eight, 16 colour, sprites as well as windows displaying different graphics modes. A feature described at 'frame-buffer animation' allows you to take part of the screen and move it around.

The quality of the TV output is said to be so good that it can make an 80 column screen readable on an ordinary TV.

Amiga planned to release the machine with free word processor and spreadsheet software at a highly competitive price of $1,500.

Needless to say both Commodore and Atari in the UK were both unwilling to discuss their plans for next year.

But a Commodore spokesman did confirm that the company has acquired Amiga and is currently 'doing something very interesting with the Lorraine.'

And how long will UK users have to wait for the goodies?

As they say, stay tuned to this channel.

My bet is that come next summer you should be able to walk in to a shop, hand over £1,000 (or less) and buy a micro that delivers everything that the Lorraine promises.

Ralph Bancroft

MONITOR

Oric modem launched

Oric has produced the micro world's equivalent of proof that the Loch Ness monster exists — it has released a modem.

Oric Products has been staked out on and off since November 1982 by die-hards anxious for a glimpse of its advertised 'Oric Communications Modem'. Decribed in those distant days as 'optional', the modem was to cost £49.95.

But at the *PCW* Show Oric launched the V23 modem for Atmos and Oric 1. Built by OEL, the company that supplies Prism, the modem is said by distributor Greg Wood of Cytel to be 'freely available'.

The unit costs £99.95, has half or full duplex operation, 1200 or 1200/75 baud, and applications software that can turn 16K or 48K Oric systems into Prestel terminals.

Cytel has been set up by Wood to specialise in viewdata applications for Oric systems. In the good old days when Oric had only an optional modem he was its viewdata manager.

From the same November 1982 ad: 'Coming soon, to complete your system: Oric Microdrive disks and speed printer'. The caption read: 'Timeless technology from Oric Products International . . .'

NEC joins price war

NEC has taken the gloves off in the battle of the portables. It cut the price of its 8201A to £395 last week, just four weeks after Tandy took the Model 100's price down to £449.

So far only NEC and Tandy have joined in the game of price leap-frogging, but Olivetti, with its M10 the third of the Kyocera trio of book-size micros, is now looking over-priced at £499.

The NEC has come down from £475, making Tandy's cut of £50 seem almost miserly. NEC has also released 25 new software packages for the machine — these include speadsheets, word processing packages, databases and a project management package.



NEC — joining battle with Tandy.

Be in it to win it

More chances for you to feather your nest while you enjoy your micro are brought to you this week by hardware and software suppliers.

There are four competitions in progress or in prospect at the moment, as can be seen in the table below. You'll have to hurry to enter these.

When we hear of more, we'll let you know.

Organiser	Closing Date	Prizes	Details
Incentive (0734 591678)	First past the post	A video recorder	Solve the mystery in the Ket Trilogy
Haresoft (01-582 8080)	First past the post	£30,000 or the Jewel of the Golden Hare	Complete the treasure hunt in Masquerade
Acornsoft, RWJ Tonkin (0754 880091)	Entries by October 17	BBC Model B plus accessories; BBC B for runner-up	Primary school chess competition
Martech (0273 768456)	October 31 and January 8	BMX bikes, micros, and colour televisions.	Eddie Kidd Challenge: best score wins

VIEW FROM JAPAN



Japan's lonely furrow

You can't really blame them, but the Japanese do get a mite touchy about the constant cries of 'mimickry' that greet their every technological effort.

When pocket calculators came down from the trees and truly portable computers roamed the plains, the Japanese claimed a first. Disregarding for the moment Adam Osborne's smart dumbell, Epson argues that the HX-20 was mankind's first portable micro. It was quickly followed by Kyocera, which supplies Tandy (Model 100), NEC (8201) and Olivetti (M10). Epson hit back with the PX-8.

The common features of these micros were their small LCD panel, flat but real keyboards, and A4 size. Various people have made various predictions about where portables go from here — more memory capacity from more tightly packed chips, more functions from software in ROM or from interfaces, and larger screens.

LCD screens with 25 lines and 80 coloumns are becoming one of the issues of the day. Here again, Japan has claimed a world first through Epson. It's a pity for Epson that it didn't tell anybody about its breakthrough until a month or so after the Portable Apricot was launched with an LCD display of these dimensions in the UK, but that is by the by.

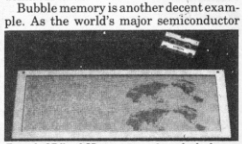
Until recently 16 lines (as on the Hewlett-Packard 110) was as high as anybody went. To jump from 16 to 25 lines, manufacturers have had to find a way to keep the contrast up to scratch so that the characters, poorly defined by CRT standards at the best of times, can be read at all.

With so many more characters on the screen, the chemical 'liquid' has to hold the contrast for a longer time or be refreshed more rapidly. An LCD works by switching individual dots on and off with every cycle refreshing the whole screen. According to the manufacturers, this problem (and the unrelated problem of physical fragility) has been solved — the technology, they say, is there, and all that's needed is for system makers to start building it into products.

Not all the micro manufacturers are convinced. Many of them don't expect to release products with 25 line displays until late next year. You'll have noticed that micro companies are rarely so cautious; the history of the industry is littered with examples of products that went on sale before they were ready. This might lead you to suppose that there is something basically unreliable about 25 line LCD screens.

In Japan such suggestions are heresy, and anybody uttering them is likely to be burnt at the Eprom. Technology here is a kind of religion, and as with any religion it demands faith.

Bubble memory is another decent example. As the world's major semiconductor



Epson's 25 line LCD screen — a tecnological miracle or a millstone?

manufacturers first grew excited about bubble memory and later closed down expensive R & D facilities in despair of making it a going proposition, the Japanese pressed ahead and today manufacture bubble memory devices for commercial consumption. The devices are still far from the mainstream. It's as though Japan felt it had something to prove.

Will the same thing happen with 25 line (and in the future, colour) LCDs? If the cost of plasma or electroluminescent flat screen displays comes down, LCDs could easily be shunted into a siding. World firsts may sometimes be a burden rather than a distinction.

Stomu Ng

CHARTS



As featured in Radio 1's Chip Shop Saturday morning.

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	1	Daley's Decathlon	Ocean	SP, C64	£7.90
2	2	Monty Mole	Gremlin	SP, C64	£6.95
3	8	Beach Head	US Gold	SP, C64	£9.99
4	3	Full Throttle	Micromega	SP	£6.95
5	4	Lords of Midnight	Beyond	SP	£9.95
6	6	Match Point	Psion	SP	£7.95
7	7	Sabre Wulf	Ultimate	SP	£9.95
8	9	Jet Set Willy	Soft Projects	SP	£5.95
9	12	Sherlock Holmes	Melbourne	SP	£14.95
10	5	Decathlon	Activision	C64	£9.99
11	13	Mugsy	Melbourne	SP	£6.95
12	16	Int. Soccer	Commodore	C64	£9.99
13	10	Micro Olympics	Database	SP, C64, AC	£6.95
14	—	Kokotoni Wilf	Elite	SP, C64	£6.95
15	14	TLL	Vortex	SP	£5.95
16	15	Astro Chase	Statesoft	C64	£8.95
17	—	Elite	Acornsoft	AC	£15.00
18	—	Scrabble	Leisure Games	SP, C64, AC	£14.95
19	—	Frank N Stein	PSS	SP	£6.95
20	—	DeathStar Interceptor	System 3	C64	£7.95

SPECTRUM

TW	TITLE	PRICE
1	Daley's Decathlon	£7.90
2	Beach Head	£9.99
3	Full Throttle	£6.95
4	Lords of Midnight	£9.95
5	Match Point	£7.95
6	Sabre Wulf	£9.95
7	Jet Set Willy	£5.95
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8	Death Star Interceptor	£7.95
9	Encounter	£8.95
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5	Apple III	£2,755
6	Sirius	£2,525
7	Wang Professional	£3,076
8	HP 85	£1,917
9	NCR Dec. Mate V	£1,984
10	Kaypro	£1,604

UP TO £1,000

TW	MACHINE	PRICE
1	Spectrum	£99
2	Commodore 64	£199
3	Electron	£199
4	Amstrad	£349
5	BBC B	£399
6	Vic 20	£140
7	Amstrad	£299
8	Atari 800XL	£199
9	Memotech	£199
10	Oric	£99

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to **September 27**. The games chart is updated every week. The prices quoted are for the no-frills model and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

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RANDOM ACCESS



If something we've said has outraged, amused or impressed you, this is your chance to answer back. To celebrate the new-look *PCN* we decided to give our 'star' contributors a pay rise — the best letter of the week will now earn you £15. So send in your contributions to: Random Access, *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG.

Don't leave out the Memotech owners



'I am the proud owner of an XYZ123 computer.' 'My ABC456 is easily the best computer in the world.' 'Why are all the computer magazines running a deliberate campaign to ignore the Zappo 84?'

These three themes seem to account for many of the readers' letters which appear in magazines.

Well, I am the owner of a Memotech 512. I am not a 'proud owner' as I had to perform no great feats, mental or physical, to prove myself worthy of ownership — I only had to pay for it. I am in no way qualified to say whether or not it is the best (or the worst) computer in the world, and I can see absolutely no reason why any editor should have any reason to deliberately ignore any particular machine.

However, I am curious as to why one machine should take off and another not. Take, as an example, the Memotech and the Amstrad. *PCN* is the only magazine to my knowledge to publish articles for the Memotech; there have been no programs published in magazines and professional software is a bit thin on the ground to say the least. This after being on the market for some 12 months.

The Amstrad, on the other hand, has already had at least one program published and professional software seemed to be available before the machine! Why?

J Waller,
Drayton, Norwich

It's a chicken and egg story. The machine needs to be popular to attract software and the machine won't sell without programs. It is rarely sufficient just to produce a good computer. — Ed.

QL programs fall down on quality

I received my QL from Sinclair on June 22 1984, but the Quill and Abacus programs failed to load, so I returned them that same day.

I received replacements on July 19, but again they failed to load, and again they were returned that day.

The next replacements were received on August 10 and, you've guessed it, failed to load. I returned them on the same day, this time with a strong letter, asking them to check them before replacing them.

I received the replacements for these on September 5 and, hard to believe, they still did not load.

If it had not been that I had access to another set of programs — in itself a rare event — I would still, after three months, (assuming the usual three week turn-round) not have the main programs, without which the QL is a waste of time.

I have also purchased four blank Microdrive cartridges from retail stores, and have had to return these five times. On one occasion, one of the replacements also failed to format.

Perhaps some adverse publicity would urge Sinclair to improve their quality control over these cartridges.

Kenneth Phillips
Milngavie

Crockers auction report shocker

I was rather shocked by your report on the first Crockers Computer Auction *PCN* 79.

Crockers were right to comment that people seemed hesitant to bid. The reason was simply that most of the items in the sale carried ridiculously high reserve prices, often approaching or exceeding the cost price of the lots involved.

Since the majority of bidders were dealers, it is no wonder that there were angry murmerings and more than the odd giggle.

Given the usual conditions in buying at auctions and that many 'sold as seen' items were firmly boxed, both Crockers and the vendors seem to have gravely mispriced stuff. Crockers also did not do themselves any favours with an inexpert auctioneer and amateurish horse-trading to reach reserve prices.

I heard rumours that the IBM PC was sold 'privately' after the sale to one of the buyers for its reserve price in the order of £1,250. This is a good way to go out of business.

I didn't do too badly myself as we collected an almost unused Apple II plus, single disk, 12 inch monitor and 16K Language card for a mere £440. This I think was one of a handful of genuine bargains at the sale. I wonder what we're going to so with it?

I do hope that Crockers learns from this first trial run and that its sales can become a sensible buying option. In the hope that things go better next time, I'll be attending subsequent sales.

Max Phillips,
London W14.

Inspector called in on Oric search

If you have ever spent a half-hour searching for an 'Oric mag' in your newsagent then you would realise that the assistance of Inspector Clouseau was needed.

It never occurred to me that keeping a low-profile was the key to selling computers. Every Friday, I stood shoulder to shoulder with a dozen others in the papershop scanning the shelves for the magazine for our machines. Guess who is disappointed? Me. The Oric owner. What are the PR people at Oric thinking about?

I know that I can send direct for the 'Oric Owner' but that's not the point. Even those independents who feature Oric aren't the answer. Software houses can't be expected to support a computer which is notable mainly for its shyness. The same applies to manufacturers of Oric peripherals.

Our machines depend on future sales of machines and the continued commitment of software houses. Having tempted us to part with £140+, Oric surely has a responsibility to make sure our investment wasn't wasted just because other manufacturers have seen the importance of exposure.

Matthew Hisbent,
Kircaldy.

Anyone want to buy a used Oric?

It amazes me that Oric is the top seller in France. Either the French are very stupid or they are given a more reliable product.

My experience with Oric computers, having had several replaced by my dealer, is that they are unreliable and that telephone calls to the company, like letters, fail to bring the required response. Usually you are ignored or fobbed off with various excuses.

I am now attempting to sell my Oric in order to be able to buy the new Amstrad.

My advice to prospective Oric owners is to forget it.

John Miles,
Bamber Bridge, Preston.

Yes, why are we waiting?

Received my copy of the new format *PCN* today and like it. Happy to see you intend to provide more for the Commodore 64.

Can I be amongst the first to respond to your 'Why are we waiting' column? And ask *you*, what ever happened to the '64 directory' program announced on the front cover of issue number 77. I looked in vain for it, and no luck in last week's or this week's copies either.

When please?

Ray Medford,
Altringham, Cheshire.

Hope this week's 64 disk utility package is a consolation. The 64 directory fell foul of those time-honoured 'technical difficulties' but we'll be running it soon. — Ed.

Somebody has to set a standard

Why has everybody got it in for MSX? Why, especially, have you got it in for MSX? Two anti-MSX articles in your last issue seem a bit over the top.

OK, so the Japanese are famous for their marketing talent, and MSX is first and foremost a marketing tactic to get them into UK homes.

But ask any Ace, Lynx, TI99/4A owner about the value of standardisation. I might add Newbrain and Dragon.

If all these micros had been produced to some kind of standard format their users could still buy software and add-ons.

Whatever you say, standards are a fact of life in the computer business — and some would say sub-standard standards. I mean, of course, the IBM standard.

Robert Harvey,
Blackpool, Lancs.

ROUTINE ENQUIRIES



Here's an end to the hair-tearing nail-biting keyboard-pounding frustration of programming your computer. Whatever your problem call on *PCN*'s panel of experts and we'll come up with an answer. Remember we cannot reply personally, so no stamped addressed envelopes please. Address your problems to *Routine Enquiries, PCN*, Evelyn House, 62 Oxford Street, London W1A 2HG.

Shop around for a D.I.Y. WP

Q I'm interested in buying a word-processing system, and have seen complete systems for the BBC and 64 for between £900 and £1,200. I don't have that much money at the moment, so I might have to buy parts of the system and upgrade later.

Would buying the system in parts be much more expensive.

P Frodler
Lewisham, London

A The ads you've seen are the dealer responding to customers' demands for convenience. Usually the individual components have only a little knocked off their total list price. So you'll probably find it cheaper to buy the component parts of the system independently.

You should therefore start looking at micros that have a decent keyboard and a good word processing program available. The 64 may be the obvious choice here. Its keyboard is good, and there are plenty of programs around. However, the Commodore disk system is fairly slow and primitive, and you'll need an interface for it if you don't want to use Commodore's own printer.

You can pick up a 64, word processor, interface and a cheap dot matrix printer for around £400, and with a domestic TV this will give you a cheap but usable system.

The Sinclair QL is also worth a mention because, although the QL Microdrives are slow as regards loading, overall they're still faster than tape. Again the system isn't really versatile enough for more advanced storage work, but someone will no doubt come up with a QL disk system soon.

At £230 for micro and monochrome monitor the Amstrad is another plausible candidate. A copy of Tasword 2, which will soon be available for the machine, and printer and cable will cost only slightly more than a similar 64 system.

The BBC B is a popular choice for word processing, but it's comparatively expensive. A basic tape system of machine, printer and word processing program on ROM chip will set you back around £570. The main advantage of the BBC is upgradeability.

Different disks on the BBC

Q I would like to ask you whether it is possible to have two different types of disk drive — for example, 5¼in and a 3 in fitted at the same time to a BBC micro.

A Al-Ammar,
Sheffield

A The BBC microcomputer normally uses the Intel 8271 disk drive controller chip. This provides a standard set of output lines for accessing and controlling the disk drive.

The BBC is normally able to control up to four drives and if your system already has four then you will not be able to easily connect another. If, however, you have only one then things are pretty straight forward since all you need to do is connect the 3 in disk in parallel with the existing one.

Inside each drive are a set of dip switches that allow you to select the drive number, either 0 or 1. Before switching on, your 5¼ in should be set up to be drive 0 and the three inch to drive 1. The two drives are then accessed as *DR.0 and *DR.1 respectively.

The main thing to ensure is that the three inch drive is fully compatible with the 8271 controller and that it is capable of taking disks with 40 tracks of ten sectors each, or 80 by 10 for the 8272 double density controller.

One drawback with using two different types of disks is, obviously, the incompatibility between them. You are probably better off sticking with 5¼ in disks since virtually all the software available for the BBC comes in this format. That is, of course, unless you can lay your hands on a 3 in drive cheaply or for free.

Flying high but still grounded

Q I intend to start taking flying lessons, but prices being what they are would like to learn as much as possible about the principles before I actually take to the air. Is it feasible to use a micro to get the hang of things beforehand, and if so, which would be the best?

B Worsthorne,
Beckenham, Kent

A That's a wacky idea, but maybe not as wacky as it first seems. The IBM flight simulator, a version of which is now available on the Commodore 64, has realistic handling capabilities, and the manual has plenty of useful theory in it.

You won't learn anything about how to use the controls (most aircraft don't have keyboards) but you will learn about when to use them. Of the flight simulators available, the PC/64 version is probably the best, but Aviator for the BBC is also good, as are the Psion Flight Simulator and Fighter Pilot for the Spectrum.

For your purposes Fighter Pilot and Aviator are probably not too much use, as you're not liable to be flying an F15, and you're equally unlikely to have things shooting at you. But if you get hold of a good flight simulator you may find it to be some use. No matter how neat it is, it'll be nothing like the real thing. But it's certainly a lot cheaper.

Sharp words from dealer?

Q I have been considering buying a Sharp MZ700, but was concerned about the lack of software for it. I asked in my local computer store, and was told that although you couldn't use tape software for other machines in it, it was possible to type in say, BBC programs from magazines. Is this true? Do you think the Sharp is a good buy?

D Pointer,
Edinburgh

A Your local computer store's knowledge seems to be pretty localised. In general, you can only type in programs for other machines if you convert them as you go along. This means you need an intimate knowledge of the Basics of both machines.

This leads on to what we think is a basic problem with the Sharp. It's quite a nice machine, but a bit pricey, and there's very little software around for it. This is all very well if you want to learn about programming, and you intend to write a lot of software yourself. But if you want to play plenty of games, or use it for serious purposes, you'll probably be disappointed.

Linking a video monitor to my ZX

Q I've been given a composite monitor, and I want to use it with my ZX Spectrum. But when I try connecting it to the output nothing happens. Why is this, and how can I fix it?

L Connoly,
Bristol

A Your problem's easy to explain. The Spectrum doesn't have a composite video output, so connecting a monitor to the TV output doesn't work. There are a couple of ways you can get round this, ranging from tricky but neat — to easy but messy.

The tricky but neat method consists of checking the various lines of the edge connector (you'll find a diagram in the manual) and connecting ground (the outside of the monitor cable) to 0V and the core to the video line.

This is all you need do for an issue 3 Spectrum, but for earlier issues there's an extra internal connection to make. This is best explained with reference to a diagram, and you'll find this in a number of books. Try the *Complete Sinclair Database* by John Gilbert and Steve Adams, for example.

It's easy to keep your connections tidy if you solder the cable to an extension edge connector, and just plug this in when you need it. If you're feeling masochistic, you could add a second output socket.

Now the slob's way to make the connection involves the modulator. If you open up your Spectrum you'll find the modulator up at the top left hand corner. The signal going into this is composite video, and the modulator turns it into a form that is acceptable to the TV. So all you need do is intercept it before it goes in.

You'll find two wires connected to the modulator on the left-hand side, and the central core of the cable should be attached to the wire nearest the back of the machine. The outer part of the cable then needs to be grounded, and soldering it to the top of the modulator case should be sufficient.

Of course, if you open your Spectrum's case you'll invalidate your warranty. But you knew that already...

How to write for Personal Computer News

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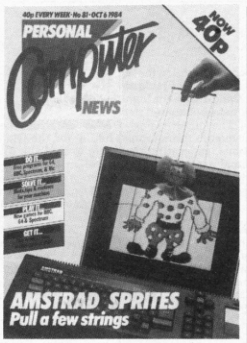
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We're looking for programs and articles on any aspect of using personal computers — including games, graphics, utilities, and applications.

If you're sending a written contribution we require it in typed form (dot matrix printout is fine), with double spacing on one side of the paper only. Where possible include short, example



programs to illustrate the article.

If you've written a program we require a working version, on tape for any machine, or on disk if you prefer for Commodore 64, Atari, BBC or Apple. We'd also like notes on how the program works, what it does, and any special features that you've included. A printed listing would be nice but isn't essential — on the other hand we can't consider listings without a working copy on tape or disk.

If you would prefer to make preliminary enquiries before submitting material, you should write — don't phone — to *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG. Questions about articles should be addressed to John Lettice, Features Editor; program queries should go to Nickie Robinson, Programs Editor.

If we decide not to use you contribution it will be returned to you if you enclose a stamped, self-addressed envelope but give us at least six weeks. You should receive payment four weeks after publication.

If you want to enclose photographs and screen shots, feel free to do so but make sure they are of good quality and make them colour transparencies or black and white prints. Do not send colour prints.

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Plenty of sound on Oric and Atmos

Following the tip in issue 74 by Bjorn M Ursford, referring to the routine at location #FA6C and its use of 14 bytes of data to generate sound, I have written the following program.

There are literally thousands of inbuilt sounds within the Oric 1/Atmos in addition to PING, SHOOT, EXPLODE and ZAP. Locations #COOO to #FFFF contain the operating system, *ie* 16,383 bytes which contain data. Anybody wishing to create unusual sounds can search through the ROM until they find a block of 14 bytes which generate the most suitable sound.

```
10 FOR!=#C000TO#C407
20 READDSPOKE1,D:NEXT
30 DOKE#2F5,#400                    :REM INITIALISE 'I' CHARACTER
40 DATA#A6,#00,#A0,#00,#20,#6C,#FA,#60 :REM SUB-ROUTINE
50 FORI=#C000TO#FFF-14              :REM STEP THROUGH ROM
55 X=I-(INT(I/256)*256)
60 POKE#401,X:POKE#403,INT(I/256)   :REM POKE ADDRESS FOR INDEX 'X' & 'Y'
70 PRINTI,HEX$(I)                   :REM PRINT LOCATION ON SCREEN
80 I                                :REM CALL ROUTINE
90 IFPEEK(520)=13THEN120            :REM FASTER IF SPACE BAR
100 WAIT100
110 IFKEY$="S"THENJ=I:I=#FFF-14     :REM DIVERT IF KEY 'S' PRESSED
120 NEXT
130 FORI=JTO0+13                    :REM)
140 PRINTI,PEEK(I)                  :REM) PRINT DATA IN BLOCK OF 14
150 NEXT                            :REM)
160 WAITTOOS!
```

As stated in Bjorn Ursford's Microwave, you must first load the index X and Y with the high and low byte start address of the block of 14. The following program will sequence through the 16K locations, generating the unique sound associated with each block. The user can stop the program by pressing 'S'. Pressing and holding the spacebar will increase the speed of the program.

When the program stops, the 14 bytes of data associated with the last sound will be displayed. These can be used to replace the data in line 100 of Bjorn Ursfords program. Using! Return will generate the required sound.

Mark Williams,
Ashton-in-Makerfield, Wigan

Fit a format to your QL

A limitation of the QL is the lack of an adequate print formatting method. There is no readily available method of tabulating figures to a given number of decimal places and with all the decimal points aligned.

I have written a function which mimics the Newbrain's formatting function and allows the number of places before and after the decimal point to be specified by simply typing: PRINT A(2,2), producing a number with two places before and after the decimal point.

In order that leading and trailing spaces and zeros are not lost, a string function has to be used. This has two parameters — the number or variable to be printed and the format specification.

The function will readily handle positive or negative numbers with the correct rounding and will cope with a format specification with or without a decimal point.

D Pearson,
Northwich, Cheshire

```
10 a=150.1234
20 g=4.2
30 PRINT f$(a,g)
8000 DEFINE FUNCTION f$(no,f)
8010 LOCAL n$,j,k,l,m,n
8020 m=INT(f) : n=f-m
8030 IF n>0 THEN n$=n : n=n$(2 TO)
8040 no=INT(no*10^n+0.4+(no>0)/10)/10^n
8050 n$=no : j=m+1+n
8060 k=(" INSTR n$)-1
8070 IF k=-1 THEN k=LEN(n$) : n$=n$ & "."
8080 IF k<m THEN n$=FILL$(" ",m-k)&n$
8090 IF n=0 THEN RETURN n$(1 TO m)
8100 l=LEN(n$)
8110 IF l<j THEN n$=n$ & FILL$(0,j-l)
8120 RETURN n$
8130 END DEFINE f$
```

QL colours revealed

After entering the following listing for the QL you will be able to find the colour of any pixel on the screen simply by typing PRINT GETCOL (X, Y). The GETCOL function works on the full screen with 0,0 at the top left and the dimensions being 512 × 256.

As the point command (which plots a pixel on the screen) works on a different size screen (448 × 200) a procedure is included which converts the pixel system in the normal graphics window #1 to the full screen system used by GETCOL. Lines 220-230 give the default values of the size and position of #1 at the start but they can easily be changed.

To see the routine working type:

```
INK 4 : POINT 50,50
PRINT GETCOL(50,50)
```

and the number 4 appears.

Daryl Tose,
Selsey, W Sussex

```
100 DEFine FUNction getcol(x,y)
110 convert x,y
120 add=INT(131072+128*y+INT(x/4)*2)
130 bit=(x MOD 4)*2
140 mask=(2^(7-bit))
150 grn=4*((mask && PEEK (add))<>0)
160 mask=(2^(7-bit)*1.5)
170 rb=(mask && PEEK (add+1))/mask*3
180 colour=grn+rb
190 RETurn colour
200 END DEFine
210 DEFine PROCedure corver (x,y)
215 LOCal s,w,h
220 s=100:w=448:h=199
230 atx=32:aty=16
240 x=INT((x*w/1.659/s+atx)/2)
250 y=INT((s-y)*h/s+aty)
260 END DEFine
```

Head-scratcher for the CPC 464

Here's a bit of a head-scratcher for Amstrad owners. The program below will output a strange collection of names, read from an area of section 1 of the machine's ROM.

The word 'Arnold' was the machine's early codename, 'Amstrad' is obvious, but who are 'Triumph', 'Saisho' etc?

In the program, using a parameter with CALL loads the parameter's value into the DE register pair on calling the machine code routine.

A further tip is that POKEing 46312 with 255 gives CAPS LOCK, POKE 46312,0 for lower case.

Clive Newton,
Cwmbran, Gwent

```
10 FOR address=&5000 TO &500B
20 READ value:POKE address,value
30 NEXT
40 FOR number=1 TO 9
50 READ addr:CALL &5000,addr
60 NEXT
70 DATA &F3,1,&89,&7F,&ED,&49,&EB,&CD
80 DATA &EB,6,&FB,&C9
90 DATA 1831,1840,1850,1858,1870,1876
100 DATA 1886,1895,1905
```

Disabling the Amstrad interrupts

Here's a handy tip for Amstrad owners.

It allows you to disable both the ESCape and CTRL-SHIFT-ESCape interrupts, thus completely preventing program interruption.

It's also handy for preventing interrupt request queuing and subsequent difficulties if you're using EVERY in a program.

To disable the ESCape, key, CALL 47944 (only works when a program is running).

To re-enable ESCape, CALL 47947.

To disable CTRL-SHIFT-ESCape, POKE 48622,201.

To re-enable CTRL-SHIFT-ESCape, POKE 48622,195

Lynda Openshaw.
Bury, Lancashire

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SCRATCH AND SAVE

Retrieving and resaving scratched files can pose a major headache when it comes to the Commodore 1541 disk drive. Stuart Cooke lends a helping hand.

Oh dear, what a shame, your Commodore 1541 disk drive has just scratched your latest programming masterpiece. You'll just have to type it all out again.

Or will you? The 1541 has a number of commands that allow you to alter the information stored on the disk. These commands are useful if you want to retrieve a scratched file, and all that you need to know is where you can find your program on the disk so you can retrieve it and resave it.

But, before you start playing around with the contents of a disk, it is important that you know how to use the disk commands – and even more important, how the disk lays out its information.

Structure of a disk

Once you've formatted a disk on a 1541 drive it will be divided into 35 tracks. Each track is split up further into sectors, with each track containing between 17 and 21 sectors (see Table 1). You'll see that the varying number of sectors is due to each track being shorter as you get towards the centre of the disk.

Block availability map

Track 18 on the disk is not used for program storage, but to keep a track of the names of files and the number of sectors available for use. The block availability map (BAM) is used to indicate whether a specific block is available for use as storage or whether it has already been used. The BAM is updated every time that you save a file onto disk or erase a file (see Table 2).

As can be seen bytes 4 to 143 of track 18 sector 0 hold 1s or 0s to indicate if a sector (*ie* block) has been used. Four bytes are used to represent the sectors of each track as shown in Table 3. Byte 0 is used to indicate the number of free sectors in a track, while the others indicate the sectors that are free.

Following the BAM on track 18 is the directory information. Bytes 144 to 255 in sector 0 of track 18 are used to contain the directory information and the type of disk. This information is laid out as shown in Table 4, and is used to form the header that appears at the top of a directory when you load it into your machine.

The sectors from 1 onwards on track 18 are used to hold the file names and information relating to any program you store on disk. Table 5 shows how the disk stores this information.

The first two bytes are used to indicate which is the next sector in the track that holds the next set of directory entries. If there are no more entries these two bytes will be 0 and 255. Each of the directory file entries consists of 30 bytes, which are the ones used to hold all the information about the files stored on the disk.

Probably the most important and most useful of these pieces of data is held in the first byte of each directory. This is the one named File Type. It tells the drive what type of file it is looking at, and whether it has been closed or is still open etc. Let's have a closer look at this byte.

Bits 0 to 2 are used to indicate which of the five types of file we are looking at. Bit 7 will be a 1 if the file is properly closed or a 0 if the file is still open. An open file can be seen on the directory with an '*' at the side of the file name.

Bit 6 of the File Type entry indicates whether a file is protected. If you set this bit to 1, it is not possible to scratch this file by normal methods, preventing accidental erasure. A protected file is indicated in a directory listing by a '<' next to the file type.

Whenever you scratch a file on a disk it is the File Type byte that is altered, together with the BAM.

When a file is scratched bits 0 to 2 are set to 0 to indicate that the file has been deleted. If you reset these bits to indicate what type of file is stored you will be able to retrieve your file. Table 5 shows how each type of file is indicated.

Obviously, because the BAM is also updated when you scratch a file it is likely that, if you have stored a program since you deleted the last one, the retrieval will not work. It is also important that as soon as you have retrieved a file you copy it.

Accessing a block on the disk

Naturally, to change any of the contents of a disk directly you must be able to access particular tracks and sectors. To access any of the data we have to OPEN a buffer for use as storage by the new disk commands. A command similar to OPEN

Table 1: 1541 disk format

TRACK	NUMBER OF SECTORS
1 TO 17	21
18 TO 24	19
25 TO 30	18
31 TO 35	17

Table 2: 1541 BAM

TRACK 18 SECTOR 0

BYTE	CONTENTS	
0,1	$12,$01	Holds track and sector number of the 1st directory entry
2	$41	Letter 'A' this indicates 1541 format
3	$00	For future use
4-143		Map of showing free and allocated blocks.
		1 = Free block, 0 = used

Table 4: Format of directory header

TRACK 18 SECTOR 0

BYTE	CONTENTS	
144-161		NAME OF DISK
162,163		ID OF DISK
164	$A0	A SHIFTED SPACE
165,166	$32,$41	CHARACTERS '2A' THIS IS THE FORMAT OF THE DISK
167-170	$A0	SHIFTED SPACE
171-255	$00	NOT USED

1,8,2,"#" opens file 1 to the disk drive (device number 8). The secondary address (*ie* the 2) must be between 2 and 14 as 0 and 1 are reserved for use with loading and saving, and 15 is linked with the error channel. The choice of secondary address is arbitrary. This form of open command causes the disk drive operating system to find the first free data buffer. There are four buffers labelled 0 to 4 and you can specify which you want to use by including a number after the # sign *eg* OPEN 1,8,2,"#3". This makes sure that buffer number three is associated with file 1. But it is much easier to leave the choice of buffer to the DOS, as it will always choose a free buffer. Now you know how to free a buffer for use we can look at the block read and write commands which you can use to access a particular sector.

The Block-Read command (B-R) is used to instruct the DOS to read a specified sector into a previously opened buffer. The Block-Read command should be sent to the disk drive using a channel that has previously been opened with a secondary address of 15 (*ie* the error or command channel). The Block-Read command will not read into the buffer all the syntax of the characters from a specified sector, and **the U1 command** or User 1 is much more efficient as it will read in complete data. The U1 command has the following syntax:

U1 *channel number/drive/track/sector*

thus the command PRINT#1,"U1 2 0 18 1" reads the contents of track 18 sector 1 on drive 0 into the buffer associated with channel 2.

The Block-Pointer command is used to access a specifying byte after it has been read into a buffer. The syntax for this command is:

B-P channel number/Position in buffer

For example the statement PRINT#1,"B-P 2 100" moves the buffer pointer to the 100th character in the buffer associated with channel 2.

Using INPUT# or GET# you can now read in the byte currently being pointed at.

Whenever you wish to write a buffer back out to disk you use the Block-Write (or B-W) command. However this command writes the buffer out from the position that the buffer pointer is pointing to. For this reason it is more common to use **the U2 (User 2) command** which always sets the buffer pointer to 0 before sending the data to disk.

The format for this command is:

U2 channel number/drive/track/sector.

The short program here reads in to a buffer the sector that holds the file name of a disk, before altering the name and sending it back out to the disk.

How to use the program

The listing here uses some of the 1541 disk commands to produce a disk editor.

The editor has these commands:

H changes the display between Hex and ASCII.

T allows you to change the track being examined.

S changes the sector being examined.

E allows you to edit the sector.

Q quits the program.

Recovering scratched files

To retrieve a file from disk after it has been scratched you need only alter the contents of a few bytes. Following the procedure below should show you how to go about the rescue. First insert a blank formatted disk into the disk drive. Then write a simple program and save it onto disk under the name of "TEST". Now SCRATCH the file from the disk.

Load in the disk editor program and examine track 18 sector 1. This is the directory track. The only entry in the directory should be your file TEST which has been scratched. You should see the file name starting at byte number five. Byte number two should hold a 0 which indicates that the file has been scratched. By selecting edit in the disk editor program you can change the contents of this byte. Change this number to '82' and this tells the DOS that this is a valid file and that it's a program file.

Once you quit the program you should be able to reload the scratched file and resave it.

Table 3: Structure of BAM of a track

BYTE	CONTENTS
0	Number of available blocks in this track
1	Bit map of sectors 0 to 7
2	Bit map of sectors 8 to 15
3	Bit map of sectors 16 to 23

Table 5: Format of the directory

TRACK 18 SECTOR 1

BYTE	CONTENTS
0,1	TRACK AND SECTOR OF NEXT DIRECTORY BLOCK
2-31	ENTRY OF 1ST FILE
34-63	ENTRY OF 2ND FILE
66-95	ENTRY OF 3RD FILE
98-127	ENTRY OF 4TH FILE
130-159	ENTRY OF 5TH FILE
162-191	ENTRY OF 6TH FILE
194-223	ENTRY OF 7TH FILE
226-255	ENTRY OF 8TH FILE

Table 6: Format of directory entries

EACH FILE ENTRY CONSISTS OF THE FOLLOWING 30 BYTES

BYTES	CONTENTS
0	TYPE OF FILE
1,2	TRACK AND SECTOR OF 1ST BLOCK OF DATA
3-18	FILENAME, PADDED WITH SHIFTED SPACE
19,20	TRACK AND SECTOR OF 1ST SIDE SECTOR BLOCK (USED WITH REL FILES)
21	RECORD LENGTH (USED WITH REL FILES)
22-25	NOT USED
26,27	TRACK AND SECTOR OF FILE WHEN OVERWRITTEN BY SAVING A FILE WITHG @
28,29	NUMBER OF BLOCKS IN THE FILE

Table 7: The type of file

FILE TYPE	FILE OPEN		FILE CLOSED	
DELETED	0000 0000	$00	1000 0000	$80
SEQUENTIAL	0000 0001	$01	1000 0001	$81
PROGRAM	0000 0010	$02	1000 0010	$82
USER	0000 0011	$03	1000 0011	$83
RELATIVE	0000 0100	$04	1000 0100	$84

Disk editor program listing

```
READY.


10 REM DISK EDITOR FOR CBM 64
20 REM STUART COOKE  AUG'84
30 REM SET UP STRINGS
40 DIM N$(255)
50 DIM @1$(32)
60 FOR D1=0 TO 15
70 D=D1*16
80 A$=CHR$(D1+48-(7*(D1>9)))
90 FOR D2=0 TO 15
100 B$=CHR$(D2+48-(7*(D2>9)))
110 N$(D+D2)=A$+B$
120 NEXT D2,D1
130 M$="H-HEX/ASC S-SEC T-TRACK E-EDIT Q
-QUIT"
140 LET D$="■■■■■■■■■■■■■■■■■■■■■■■■"
150 D1$="■■■■■■■■■■■■■■■■■■■■■■■■"
160 LET T$="    ENTER NEW TRACK
      ■■■■■■■■■■■■"
170 LET R$="    ENTER NEW SECTOR
      ■■■■■■■■■■■■"
180 :
190 REM SET UP THE SCREEN
200 PRINT "■■■■■■■■0 1 2 3 4 5 6 7 8 9 A B
 C D E F"
210 FOR X=0 TO 15
220 PRINT"■■";N$(X)
230 NEXT X
240 PRINT "■■■
          "
250 PRINT M$
260 :
270 :
280 REM OPEN ALL FILES AND SET UP VARIAB
LES
290 OPEN 1,0:REM OPEN CHANNEL 1 TO SCREE
N
300 OPEN 2,8,2,"#":REM OPEN ANY BUFFER O
N DISK DRIVE
310 OPEN 3,8,15:REM OPEN ERROR CHANNEL T
O DISK DRIVE
320 T=18:S=0:ERR=0:H=0
330 :
340 :
350 REM PRINT SECTOR ONTO SCREEN
360 PRINT D1$;"■■■■■■TRACK:";T;"■   ■";
370 PRINT D1$;"■■■■■■■■■■■■■■■■■■■■SECTOR:";S
;"■   ■";
380 GOSUB 500:REM READ IN SECTOR TO BUFF
ER
390 GOSUB 550: REM ERROR ?
400 IF ERR= 1 THEN CLOSE1:CLOSE2:CLOSE3:
GOTO 280
410 GOSUB 630:REM PRINT OUT REC
420 GET K$
430 IF K$="T" THEN PRINT D$;T$;:INPUT T:
GOTO 350
440 IF K$="S" THEN PRINT D$;R$:INPUT S:G
OTO 420
450 IF K$="H" AND H=0 THEN H=1:GOTO 350
460 IF K$="H" AND H=1 THEN H=0:GOTO 350
470 IF K$="E" THEN GOSUB 880:PRINTD$;M$
480 IF K$="Q" THEN CLOSE1:CLOSE2:CLOSE3:
STOP
490 GOTO 420
500 REM READ IN SECTOR FROM THE DISK DRI
VE
510 PRINT#3,"U1";2;0;T;S
520 RETURN
530 :
540 :
550 REM CHECK ERROR CHANNEL
560 INPUT#3,DS
570 IF DS<>0 THEN PRINT D$;
580 IF DS<>0 THEN PRINT"                ■DI
SK ERROR■
                  ";
590 FOR X=1 TO 100:NEXT X
600 PRINTD$;M$;"■"
610 IF DS<>0 THEN ERR=1
620 RETURN
630 REM DISPLAY SECTOR
640 PRINT"■■"
650 PRINT#3,"B-P",2,0
660 GOSUB 550:REM ERROR?
670 IF ERR=1 THEN CLOSE 1:STOP
680 PRINT"■■"
690 FOR X= 0 TO15
700 PRINT "■■■■■";
710 LET S$=""
720 FOR Y=0 TO 7
730 GET#2,A$:GET#2,B$
740 IF A$="" THEN A$=CHR$(0)
750 IF B$="" THEN B$=CHR$(0)
760 A=ASC(A$)
770 B=ASC(B$)
780 IF H=0 THEN PRINT N$(A);
790 IF H=0 THEN PRINT"■";N$(B);"■";
800 IF A<32 THEN A=46
810 IF B<32 THEN B=46
820 S$=S$+" "+CHR$(A)+" "+CHR$(B)
830 NEXT Y
840 IFH=1 THEN  PRINT S$;
850 PRINT
860 NEXT X
870 RETURN
880 REM EDIT SECTOR ROUTINE
890 IF H=1 THEN H=0:GOSUB 630
900 PRINT D$;"FINISHED
          "
910 INPUT#1,I$
920 IF I$="" THEN GOTO 910
930 IF LEFT$(I$,8)="FINISHED" THEN GOSUB
 1110:RETURN
940 LET Q$=MID$(I$,1,2)
950 LET Q$=MID$(Q$,2,1)
960 LET Q=ASC(Q$)-48
970 Q=Q+7*(Q>9)
980 LET Q1$=MID$(I$,4,35)
990 B$=""
1000 FOR C=0 TO 15
1010 LET A$=MID$(Q1$,C*2+1,2)
1020 A=ASC(A$)-48
1030 A=A+7*(A>9)
1040 B=ASC(MID$(A$,2))-48
1050 B=B+7*(B>9)
1060 B$=B$+CHR$(A*16+B)
1070 NEXT C
1080 PRINT#3,"B-P";2;0*16
1090 PRINT#2,B$;
1100 GOTO 880
1110 REM WRITE THE BUFFER
1120 PRINT#3,"B-P";2;0
1130 PRINT#3,"U2";2;0;T;S
1140 RETURN

READY.
```

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READOUT





'The Incredibly Easy Way to Program Your VIC 20!' by Peter Stanhope, published by Interface Publications, at £3,95 (paperback, 181 pages).

Considering that the Vic 20 can usually be purchased with a fairly comprehensive guide to both the machine and Basic for beginners, I would have thought that books like this were slightly redundant. Obviously neither the author or the publishers of this book agree.

But one would have thought that they would at least make some attempt at accuracy. I got as far as page six, where Mr Stanhope cannot decide if PRINT "12*13" is the direct quote mode or the direct operational mode. Beginners beware.

The book is more than 180 pages long, but much of it is taken up with vastly oversized headlines and what we in the print trade call creative use of white space — in other words, not enough words to fill.

However, having said that, it does have some useful hints on, for example, indexing on longer tapes and an idiot's guide to the most common errors that come up on a beginner's screen. But on the whole, I think that they would be better off reading the handbook. **LT**



'Vic Games' by Kevin Bergin, published by Duckworth at £6.95 (paperback, 179 pages).

Game books for the Vic are very plentiful, so one with a £6.95 price tag has to justify itself. And with only 17 games plus a couple of utility programs, this one doesn't.

It's a pity, because there is a lot that is right about Kevin Bergin's book. The programs are set in easy-to-read computer printouts and each game is prefaced with an illustration of what the screen should look like. Better still, Mr Bergin includes a reasonably comprehensive explanation of why the program is structured the way it is — a useful feature for beginners just experimenting with their Vic.

The games themselves are all a bit basic (pardon the pun) — versions of golf, PacMan (called Dot Muncher here) and invaders — yet another version of that arcade favourite, space invaders. Most will run on an unexpanded Vic; two — Firing Tank and Agent — require expansion.

All in all a nice book, shame about the price. **LT**



'Computer FUNdamentals' by Barbara Kurshan and Nancy Healy, published by Prentice-Hall International, at £16.45 (paperback, 224 pages).

A colourful conte-pencil cover wraps around this spiral-bound four-section, 25-chapter, volume which aims to teach the younger set about the wonderful world of home computers.

The authors have a twee, 'are-you-sitting-comfortably, then-let's-begin' approach to the subject. They obviously want to engender a friendly atmosphere as they sign themselves Barbara and Nancy in the introduction, which pushes home the message, 'Computers are FUN'.

Well, yes, so they may be. As the book doesn't stick to simplicity ad infinitum, it could be the authors want to teach us adults something, too. We are, after all, introduced here to the concepts of spreadsheets, logic and word processing.

But could it also be that the authors are learners, too? They do make rather a point of acknowledging a friend's help in 'loading the paper and showing us how to use the printer.

Each section lists about 40 branded software programs which the reader can go out and buy before reading the section. But it's not clear whether the authors have tested all of these, nor which programs match with which machines.

Don't go searching for an index; it's missing. What is at the back of the book is a list of other books, magazines and software packages to check out. But they're all in the United States, because this is an American book. Nothing wrong in that — until you look at the Stateside price, which is $16.95. Maybe Prentice-Hall use a duff computer to work out their miserly exchange rate of one dollar and three cents to the pound. We know sterling has been faltering lately, but it hasn't yet stooped that low. **MF**



'The IBM Personal Computer Book' A User's Guide' by Dennis Jarrett, published by Hutchinson, at £12.95 (paperback, 176 pages).

Yet another book on the IBM Personal Computer . . . but as author Dennis Jarrett says in the introduction: 'It's worth me taking a few words to justify the annihilation of a few more yards of Finnish forest on this addition to an already crowded marketplace.'

Thank you Mr Jarrett. Without more ado, let me say that the book is attractively laid out — despite a rather ugly typeface used for the main body of the text — and that it would be a great shame to thrust it onto a burning bonfire come November 5.

This book differs from others in two major respects: firstly, it presents the IBM PC without too much obscure technology, making it well worth the £12.95 price tag for computer novices; secondly, it explains how to get the most out of the PC without needing a computer sciences degree.

Divided into seven sections, the book takes you through the PC from the system unit, keyboard, displays, operating systems and programming languages, disks, printers and documentation in a lucid, easy-to-read style.

One of the most interesting sections though is 'How to be a Happy User'. This gives handy tips on purchasing, health problems associated with using computers, plus the thorny subject of maintenance. The chapter entitled: 'Last Words' in this section speculates about the PC's immediate future and draws some interesting comparisons with other rivals such as Wang, Digital Equipment and Hewlett Packard. All in all, not a bad buy. **CO'G**



'Educational Programs for the Electron' by Ian Murray, published by Century at £6.95 (paperback, 197 pages).

The use of computers in education has become a popular bandwagon, and here's another author who's hopped onto it. The vast majority of the programs in this book are computer conversions of games and puzzles I used to play with paper and pencil, and that is exactly where they should have stayed.

Computer resources in schools are too scarce and valuable to be squandered in this manner. Micros should be used for tasks to which they are uniquely suited. Quizzes and converted board games, of which this book contains a few, do not fall into this category.

Having said this, there are a few genuinely useful programs here. One particularly novel 'game' is called Life, or Cancer if you're pessimistically inclined. It simulates cell regeneration and poses a challenging test of logic.

Physics students are well catered for with N-Particle — a demonstration of particle mass interactions — and Interference, which plots realistic interference patterns. Draw and Save allows circuit diagrams to be designed and saved to tape.

The powers of computer graphics for 3-D visualisation are put to good use in Building Blocks and 3-D Prisms, and Archery and Vector Race Game have a few things to teach about gravity and vector mathematics respectively.

If you have an Electron at home and you're desperate for software with an educational bias this book may interest you, but I think it has little to offer to schools apart from a few specialist applications. **LB**



'An introduction to 6502 Machine Code' by RA & JW Penfold, published by Bernard Babani (publishing) Ltd at £1.95 (paperback, 107 pages).

If you've got a couple of quid spare and you're looking for some light reading on 6502 machine code — then this book wouldn't go amiss.

Owners of BBCs, Vic 20s and Orics who want to make their first million with a blockbuster game can start by dipping into the pages of this paperback to unravel those bits of binary. In the first chapter you cover essential ground such as Assembly language, the processor, binary, stacks, flags and memory organisation.

The following chapters deal with the 6502 instruction set, addressing modes, sorting and execution and input/output. In six chapters the Penfold duo cover quite a lot of ground as an introduction — but you'll need a good head to take it all in.

There aren't many diagrams, however, there are a few machine specific listings for you to put into practice what you've learnt. After reading this book I'm sure you will have learnt something. **SG**

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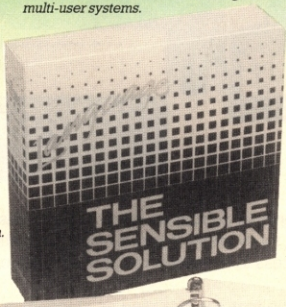
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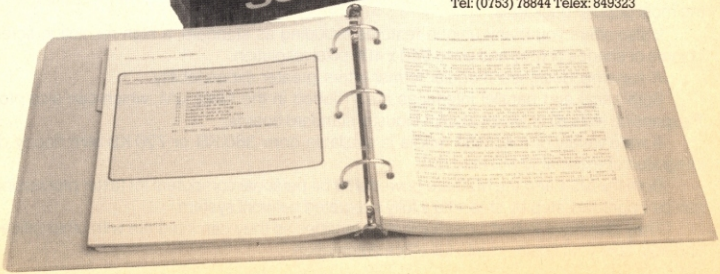
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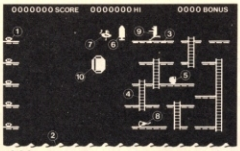


Rocket Man

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1. Diamonds
2. Sea
3. Platforms
4. Ladders
5. Fuel Cans
6. Rocket
7. Vulture
8. Leg of Lamb
9. Player
10. Bubloid
11. Fuel Gauge
12. Men Remaining

Get rich quick by collecting Diamonds that are simply lying there waiting for you!

Oh . . . I forgot to mention that there are one or two problems! There is an expanse of Shark infested water between you and the Diamonds and a strange breed of Bubble that seems hell bent on getting you in it! Somehow you must cross it. . . .

You have a Rocket Pac to help you (a Vulture on higher levels) but you must rush around the platforms and ladders collecting cans of fuel (legs of lamb with the Vulture) and cursing that weird Bubble. Once you have enough fuel then it's Chocks Away!

Oh . . . but don't run out of fuel on the way – otherwise it's . . . . SPLASH!

The aim is to collect all the diamonds from the far left hand side of the screen, whilst avoiding the rampant Bubloid. These emerge from the sea and are hell-bent on returning to their watery habitat with you in tow. Sooner or later you are going to end up in the drink – The idea is to make it later!

By belting round the system of platforms and ladders, cleverly avoiding the Bubloid, you collect the fuel cans which appear in random positions, until you consider that your fuel gauge indicates sufficient in the tank. Now you can go and collect your rocket. With the rocket-pack strapped to your back you can fly across the expanse of sea to collect the diamonds . . . but don't run out of fuel or your rocket-pack will simply disappear and you will wind up in the drink!

There are six stages with six different platform layouts. On stages 1-3 the Bubloid, which floats in front of the platforms with uncanny ease, gets an ever increasing ability to home in on your position, making the task of staying alive more demanding with each stage. On stages 4-6 you once again start with the easiest Bubloid (which is a blessed relief!) but the fuel cans are replaced by legs of lamb which you must collect to feed your vulture, and once it has enough energy (or you think it has!) you must flap across the water on its back to collect the diamonds.

Extra men are awarded for every 10,000 points – but ONLY once you have collected all the diamonds and so completed each particular stage.

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Software Farm, 155 Whiteladies Road, Clifton, Bristol BS8 2RF.
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TIME WARP

A W Smart has come up with a digital clock program for BBC owners

This BBC clock program is based on the OSWORD routine with A = 4 $ (see program lines 180 to 220). Further information may be obtained on page 4670 of the user guide.

A demonstration program in the advanced user guide prints the clock on the mode 7 screen using the OSWORD routine but the display is handled by the OSWRCH routine. This interferes with the editing keys if the clock is running while programs are being entered and revised.

In this program I have poked the display to the screen.

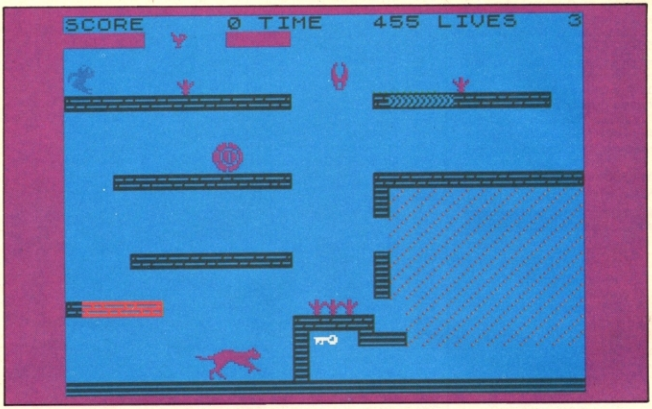
Program notes

10	Sets screen.
20-30	Sets pointers for operating system routines.
40-90	Set pointers to storage areas.
100	Sets origin for machine code.
110	Two pass assembler.
130	Starts assembly.
140	Sets start label.
150-170	Save status register, X and Y registers and accumulator onto stack.
180	Gets lobyte into X.
190	Gets hibyte into Y.
210	Sets the clock.
240-540	Does the clock and checks for validity of seconds and minutes.
550-580	Does hours.
590	Updates seconds.
610-630	Prints clock on screen (only in mode 7).
650	Recalls processor status, accumulator and registers.
680	Returns from interupt.
700-710	Point vector event to clock.
720-730	Sets up five byte parameter block.
750	Starts event 5 to print clock every time the timer crosses zero.
770-830	Gets and evaluates the time. Then put it into the time locations specified by lines 40—60.
840	Starts the clock.

```
 10 MODE7
 20 Oswrch=&FFEE:Osword=&FFF1
 30 Osbyte=&FFF4:Evnt=&220
 40 hrhi=&70:hrlo=&71:?&72=&3A
 50 minhi=&73:minlo=&74:?&75=&3A
 60 sechi=&76:seclo=&77:?&78=&0D
 70 hr=&79:Par_block=&7A
 80 BASE=&80:!BASE=&7C20
 90 base=&82:!base=&70
100 MC%=&D00
110 FOR Pass=0 TO 2 STEP 2
120 P%=MC%
130 [OPT Pass
140 .clock
150  PHP:PHA          \ Save Stat.R, Acc and ...
160  TXA:PHA          \ ...X and ....
170  TYA:PHA          \ .Y regs on stack
180  LDX#Par_block AND &FF
190  LDY#Par_block DIV &100
200 \ Obtain X and Y values to set..
210  LDA#4:JSR Osword
220 \ ..timer to value at addr 9iven by X(low byte) and Y
    (hi9h byte)
230 \ START OF CLOCK MECHANISM
240  LDA seclo
250  CMP#&39          \ Is seclo="9"
260  BNE over         \ No - 9oto "over"
270  LDA#&2F          \ Make ...
280  STA seclo        \ seclo="-1" ...
290  INC sechi        \ ..and inc sechi
300  LDA sechi
310  CMP#&36          \ Is sechi="6" ..
320  BNE over         \ No -
330  LDA#&30          \ Make ...
340  STA sechi        \ sechi="0"  ...
350  INC minlo        \ ..and inc minlo
360  LDA minlo
370  CMP#&3A          \ Is minlo="10"
380  BNE over         \ No -
390  LDA#&30          \ If YES then ...
400  STA minlo        \ ..minlo="0" and.
410  INC minhi        \ ..inc minhi
420  LDA minhi
430  CMP#&36          \ Is minhi="6"..
440  BNE over         \ No -
450  LDA#&30          \ If YES then...
460  STA minhi        \ ..minhi="0" and.
470  INC hr:LDA hr
480  CMP#24           \ 'witchin9 hour'?
490  BNE sethr        \ No -
500  LDA#0:STA hr     \ YES- set hr and.
510  LDA#&30
520  STA hrhi         \ ..hrhi and .
530  STA hrlo         \ ..hrlo to "0"
540  JMP over
550 .sethr
560  INC hrlo:LDA hrlo
570  CMP#&3A:BNE over
580  LDA#&30:STA hrlo:INC hrhi
590 .over INC seclo
600  LDY#&FF
610 .loop INY
620  LDA (base),Y:CMP#&0D:BEQ end
630  STA (BASE),Y:JMP loop
640 .end
650  PLA:TAY
660  PLA:TAX
670  PLA:PLP
680  RTS
690 ]: NEXT Pass
700 ?Evnt=MC% AND &FF
710 Evnt?1=MC% DIV &100
720 !Par_block=&FFFFFF9C
730 Par_block?4=&FF
740 REM lines 730,740 set the 5-byte timer block to -
    100 (centisecs.)
750 *FX14,5
760 REM line 750 enables interval timer crossin9 0 event
770 PRINT':INPUT"HOURS ";H:?hr=H
780 H1=&30+(H DIV 10):H2=&30+(H MOD 10)
790 ?hrhi=H1:?hrlo=H2
800 PRINT':INPUT"MINUTES ";M
810 M1=&30+(M DIV 10):M2=&30+(M MOD 10)
820 ?minhi=M1:?minlo=M2
830 ?sechi=&30:?seclo=&30
840 CALL clock
```

GAME GENERATORS

David Lester scans four pieces of software that claim to allow users to create games of a relatively good commercial quality.



Commercial software becomes more sophisticated all the time, or so the adverts would have us believe. Not only can you buy games which use ultra-smooth, high resolution graphics to enhance your playing, but you can also buy programs that let you create games of commercial quality without any programming knowledge. At least that's what some software houses claim. But can their programs back this up?

All four pieces of software dealt with here have the same objective, but go about achieving it in slightly different ways. *Hurg*, from Melbourne House, employs a series of menus from which you can select the options you want to build up your game. *Fifth* on the other hand adds new commands to the standard Spectrum Basic. These let you program fast-moving, smooth graphics from Basic, as each command is the equivalent of calling a machine code routine. The other two *Scope 2* from ISP and *White Lightning* from Oasis Software, are actually completely new languages.

Hurg

Probably Hurg's greatest asset is that it's easy to use. In fact, you can operate most of it using just a joystick. Unfortunately, it also produces the least appealing results as far as games are concerned.

Its sprite designer/editor is good and you also get an animation routine. This switches the computer between a number of sprites, for example to show the different leg positions of somebody walking. You can set the movement pattern quite easily, but that is about as far as it goes. You need to create any background graphics yourself, and then load them in as a SCREEN. There are no sound facilities whatsoever.

I found it difficult to do any more than get a sprite moving around the screen. Although provision is made for setting the conditions for explosions and deaths, the manual is poor and the menus almost impossible to decipher. Melbourne House claims that you can 'design your own computer games in minutes', and that 'the hardest thing you will have to do is to think of a game title and design the characters.' Not a chance — it will take you a long time to get to grips with the package.

A good hint as to the potential of each of these four games designers is the demonstration provided by the software houses. Hurg comes complete with 3 'ready to play, fast action arcade games'. I suppose each one is better than the so-called 'full arcade game' in another Melbourne House release. *Mugsy*, but even so, they are terrible. And if that is the best Melbourne House can do, what chance has anyone else got?

Fifth

Fifth is probably the easiest of the four programs to get decent results out of, provided you can program in Basic, as all you need to do is learn a few new commands. Once you have loaded the program in, you simply put the new commands in REM statements in the same way as you do with some assemblers.

You can still use REMarks in the normal way by putting an asterisk at the start of any real REM statement.

Two of the more useful commands are GET and PUT — these will be familiar to anyone with any experience of a Dragon. With these you can store sections of the screen in a string variable, or array, and then recall it using the PUT command anywhere on the screen.

Fifth also uses interrupts for such things as collision routines, which enables the main body of the program to run much faster than it would otherwise. Although the manual is poorly printed, and a touch confusing in places, the commands are well named and I soon found myself quite happy with them.

Another advantage with Fifth, as opposed to Hurg, is that it includes some new sound commands — and the sound effects you can achieve from machine code (yes, even on a Spectrum) are infinitely better than those obtainable from Basic.

The demo program included is probably the best of any of the pieces of software reviewed here, and shows that speed and smooth motion can be achieved with very little effort. It only uses small graphics, however, and this limits it.

Scope 2

Scope 2 is, believe it or not, an improved version of the award winning Scope, and actually provides you with a new language specifically designed for writing arcade games. It includes commands for colour, sound and graphics, as well as more normal things like variables. When you have written a program in Scope 2 (in REM statements) you compile it into machine code, which is why the result is faster than Basic. You can then use your Scope program either as a machine code routine in your Basic program or as a complete program (depending, obviously, on what you write in Scope 2).

The commands are fairly similar to machine code, as is the structure of the whole language. This could be either an advantage or a disadvantage. If you wanted to learn machine code but found it too hard, this program might be a good stepping stone to it, or you might find that it's alternatively also too hard to learn.

Despite a reasonable manual, some of the commands are quite difficult to grasp if you don't know anything about machine code. You could be forgiven for thinking that a program written in Scope 2 was an assembly language listing.

That said, the program goes further toward offering a completely versatile games-designing package than either of the two previously mentioned offerings. The results can be every bit as good as most commercial arcade games, although to get equivalent results you need to put in a lot of effort.

The demo routines are notably bad, and ISP would seem to have misjudged things a bit. When I saw the demo I thought that the package was a waste of money, but once I started to get to grips with the language a little bit, I found it had great potential. There is even a sprite facility, including collision detection — just what you want for arcade games.

White Lighting

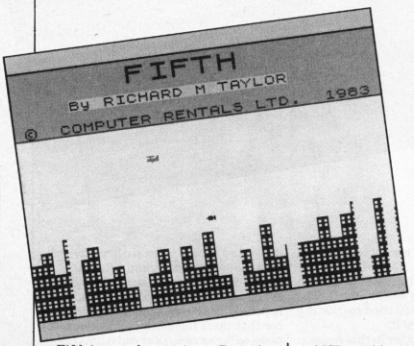
This is similar to Scope 2 in that it is a complete language, but it is much, much more. In fact, it is a fully-fledged games development system.

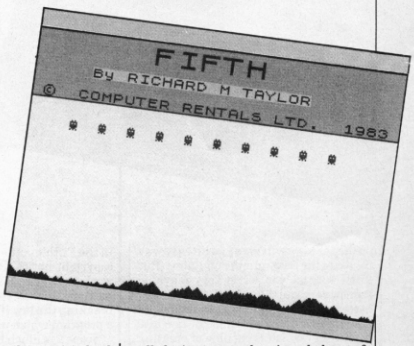
The system has several distinct sections: the White Lightning language itself (really two languages: a version of Forth and an additional graphics language called Ideal) and a sprite development package for use within programs that have been written with White Lightning.

The main section, the White Lightning language, is complicated. Unless you already know Forth you will need to spend a long time trying to learn it. Ideal on its own has over 100 commands. But once you've mastered it, I'm sure it will be an extremely versatile tool for developing games. I say 'I'm sure' because after a week's trying I am by no means proficient in it.

The sprite designer maintains the high standard set by the language itself. It enables you to define up to 255 sprites, some of which can even be larger than the screen display. You design your sprite either in sections one character square large or as hexadecimal numbers.

You can do all the usual things to your design too, such as inverting and rotating it. When you have finished your sprites, you can save them to tape for use in your White Lightning programs. If you feel you have had enough trouble becoming a Matthew Smith, and do not want to emulate Leonardo da Vinci as well, don't worry — there's a whole set of ready-to-use sprites on the tape. These cover most games (PacMan, Defender, and all the usual ones). But for me, half the fun of designing a game is creating the graphics, so I can't see these being used very much.





Fifth is a good extension to Basic, but the results will not be as good as the best arcade games. They will almost certainly be better than the average game listing you might find in a magazine — this worthy publication excepted, of course.

20 ►

Oasis provides a detailed manual, and you'll get a shock when you see it as it's a substantial-sized book.

The best way to get started with the package is probably to write a few routines with it first. You can call these as machine code routines from within a Basic program until you feel confident enough to write an entire program using White Lightning language.

Once you have got the hang of it, White Lightning provides some incredible features: interrupt-driven routines, good sprite handling and more besides. My only doubt is that, if you are going to the trouble of learning White Lightning, why not go that little bit further and learn machine code? However, White Lightning is slightly more user-friendly.

Conclusions

As you can probably tell, the packages are similar in concept but different enough to be able to survive in the same market together. There seems to be, inevitably I suppose, a trade-off between how powerful a package is and how easy it is to use.

Forget the adverts — none of the packages here will give you an easy way to create the next number one game. But Fifth will let you write very playable games very quickly. Scope 2 gives you better quality graphics but takes more effort, and at the top of the scale is White Lightning, which is capable of creating something almost as good as Jet Set Willy — just don't make me write it.

As for Hurg, it is basically a waste of money.

With no sound and making you define your own backgrounds separately, it is a dead loss as a games designer package.

What you need to know about copyright

Should you write a good game with one of these packages and want to sell it, it would help if you know the views of various software houses about copyright.

Since one aim of each of these pieces of software is to enable anyone, programmer or not, to produce games of a commercial standard, it is quite likely that you will be interested in whether, and if so how easily, you can sell games you write using these products.

The easiest of the products to answer this for is Hurg. To start with, it is most unlikely that you will produce good enough programs with it, but more importantly, the host program Hurg must be in memory for your game to work. This means that a substantial part of the package you would try to sell would belong to Melbourne House — so you would be breaking the law to try and sell it.

Fortunately, all is not lost, as Melbourne House offers to market such games if they're good.

CRL makes no mention of the problem in the Fifth manual, except to provide a copyright notice. Because of the way it works, however, Fifth must be present in memory, so that you would probably be breaking the law if you tried marketing a program which uses it.

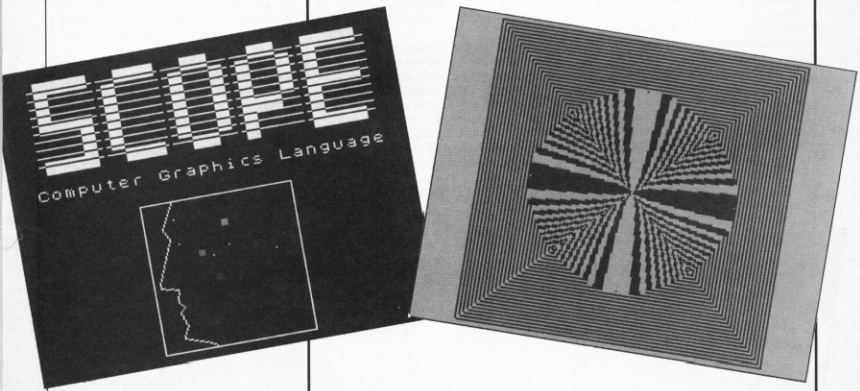
Scope 2 is much better in this respect, since it compiles your Scope programs into machine code, and you don't need to have Scope 2 in memory to be able to run your own games. For this reason Scope 2 performs much the same task as an assembler, and so I see no reason why you should not be free to sell anything you write with it to a software house, if you can find one that wants to buy it.

White Lightning is the same as Scope 2 in this respect, but it also has several notices regarding the subject of you marketing games written using it. Unfortunately, these contradict one another.

For example, on the back of the plastic cassette wallet is a notice saying: 'Programs written using White Lightning can be marketed only by arrangement with Oasis Software'. But the manual it says: 'Software produced using White Lightning can be marketed without restriction'. It then goes on to say that a mention on the cassette sleeve would be appreciated — more that fair, it seems to me.

I am inclined to take this latter as being the true case, but if in doubt, ask the software house you intend to sell your game to.

Whichever package you have, if you have written a piece of good software with it, the people likely to be most interested are the software house which sells the original program. After all, if it is good it helps advertise their product, at the same time as making them (and hopefully you) some money. Do remember that there have been almost no test cases as far as computer copyright goes, and that a Portugese company is openly selling other companies' games without paying a penny in royalties and is unlikely to be prosecuted. The fog will no doubt clear eventually, but it could take sometime.



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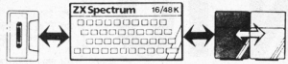
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LOOK IN TO THIS PROG

John Ingham has come up with a program to help you design title screens and game backgrounds

Picture Pro is a graphics utility for the Vic 20 with 3K expansion. It offers a quick and easy way to create screen designs using the Vic block graphics set — useful for title screens and games backgrounds.

It comprises two programs: the actual screen designer, and a program that creates a new program incorporating your design.

Instructions

Insert the memory cartridge and load and run the first program. You will be invited to enter the screen and border colours — use keys 1 to 8 for their corresponding colours. You can also use one of the Vic's 'multicolours' for the screen by further entering 1 to 8 during the following 'time out' sequence. The keys give the following colours:

1 Orange	2 Light orange
3 Light red	4 Light cyan
5 Light purple	6 Light green
7 Light blue	8 Light yellow

If you don't want these colours simply wait for the timer to run out. Your first screen choice will be accepted.

You also need to set an initial cursor colour, although you can change this at any time during the program. Use f2 followed by the keys 1 to 8. You will then be presented with a blank screen.

Use the cursor keys to move the drawing cursor around the screen. For diagonal movement the function keys give the following:

f1 up/left	f3 up/right
f5 down/right	f7 down/left

You can exchange the cursor charac-

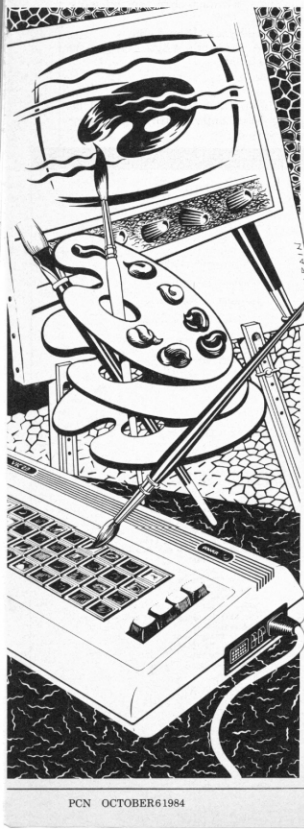
Program listing

```
20 IFFRE(1)<2500THENPRINT"■■■■  SNOT ENOUGH MEMORY■":END
23 POKE657,128:POKE36874,0:POKE198,0:POKE36878,15
26 POKE36879,25:PRINT"■■■■■■■■O.K  NOW START DRAWING"
29 PRINT"■■■ PRESS A KEY TO START "
32 PRINT"■■AFTER WHICH SELECT":PRINT"■COLOURS FOR:-":PRINT"■BORDER:SCREEN:CURSOR
"
35 IFPEEK(197)=64THENPOKE36876,(PEEK(36876)+22)ANDD255:GOTO35
38 POKE36879,25:POKE36878,9:POKE36876,0:POKE36874,255
41 PRINT"■■■CHR$(142):CN=160:CO=32:CR=14:MN=0:IL=0:PN=7933:PC=36652:TI$="000000
"
44 PRINT"ENTER:- BORDER:SCREEN 1-8 KEYS:CURSOR AFTER SHIFT & 'F2' KEYS":GOSUB167
:PRINT"■"
47 POKE198,0:PRINT"■":GOTO146
50 PX=PEEK(197):SH%=PEEK(653)
53 POKE36876,0:POKE36874,0:GETI$:IFI$<>""ANDI$<>CHR$(34)THENPOKEPS,CN:POKEPT,RX:
GOTO66
55 IFSHX=4ORSHX=1ANDPX=39ORPX=47THEN77
56 IFTIC150TO58
59 TI$="000000":IFPEEK(PS)=32THENPOKEPS,CN:POKEPT,CC:GOTO58
62 IFMN=1THENPOKEPS,32:GOTO58
65 POKEPN,32:GOTO58
66 IFPX=64THENPX=PEEK(197)
68 POKE198,0:IFMN=1THENPOKEPT,CC
71 POKE36874,250:IFSHX=1ANDPX=47THENPOKE36874,128:GOSUB167:GOTO58
74 IFSHX=1ANDPX=39THENPOKE198,0:GOTO191
77 IFSHX=4ANDRV=0THENRV=1:CN=CNOR128:POKEPS,CN:POKEPT,CC:GOTO58
80 IFSHX=4ANDRV=1THENRV=0:CN=CNAND127:POKEPS,CN:POKEPT,CC:GOTO58
83 IFI$="■"THENCR=156-CR:PRINT"■"CHR$(CR):GOTO58
86 IFI$="■"THENPOKE36874,0:POKE36876,0:POKE36879,25:CLR:GOTO212
89 IFI$="■"THENWAIT197,64:GOTO23
92 IFI$<CHR$(20)ANDDL=1THENDL=0:PN=PS-MV:PC=PT-MV:POKEPS,CO:POKEPT,CC:PS=PN:PT=P
C:GOTO58
95 IFI$=CHR$(20)GOTO58
101 IFMN=1THENDL=1
104 IFPX=8THENMN=1-MN:MV=0:IFMN=0THENDL=0:WAIT197,64:GOTO58
105 IFPX=39THENMV=-23
107 IFPX=47THENMV=-21
110 IFPX=55THENMV=23
113 IFPX=63THENMV=21
116 IFPX=64THEN58
119 IFSHX=0ANDPX=31THENMV=22
122 IFSHX=1ANDPX=31THENMV=-22
125 IFSHX=0ANDPX=23THENMV=1
128 IFSHX=1ANDPX=23THENMV=-1
131 IFPX<>39ANDPX<>47ANDPX<>55ANDPX<>63ANDPX<>31ANDPX<>23ANDPX<>8THENGOSUB224:GO
TO58
134 POKEPS,CN
137 PN=PS+MV:PC=PT+MV:IF(PS<7702ANDMV<-1)OR(PS>8163ANDMV>1)GOTO58
140 IF(PS-2)/22=INT((PS-2)/22)AND(MV=-1ORMV=-23ORMV=21)THENPN=PN-MV:PC=PT-MV:GOT
O58
143 IF(PS-1)/22=INT((PS-1)/22)AND(MV=1ORMV=23ORMV=-21)THENPN=PN-MV:PC=PT-MV:GOTO
58
146 CR=CO:IFCO=CNTHENCR=32
149 GOSUB203:CO=PEEK(PN):POKEPN,CN:POKEPC,RX:POKEPC-MV,OX:IFMD=0THENPOKEPS,CR:
152 IFMN=0ANDPEEK(36879)<128ANDPEEK(PN-MV)=32THENPOKEPC-MV,CH:GOTO158
155 IFMN=0ANDPEEK(PN)=32THENPOKEPC-MV,CC:POKEPC,CC
158 MD=MN:PS=PN:PT=PC:IFPEEK(197)=64ORMV=0THEN58
161 IFMN=1THENPOKE36876,(PEEK(36876)+28)ANDD255
164 POKE36874,(PEEK(36874)+128)ANDI28:ONSQR(TI-50)+2GOTO158,158,137
166 POKE36874,(PEEK(36874)+30)ANDD255
167 GETF$:IFF$>"8"ORF$<"1"THEN166
170 POKE36879,VAL(F$)+7
172 POKE36874,(PEEK(36874)+10)ANDD255
173 RX=0:GETI$:IFI$>"8"ORI$<"1"THEN172
176 IFI$=F$THENPOKE36879,(VAL(F$)+7)+((VAL(I$)-1)*16):GOTO182
179 POKE36879,PEEK(36879)+(16*(VAL(I$)-1+RX))
182 IFPEEK(197)<>64THEN182
185 FORM=0TO200:NEXT:IFPEEK(197)<>64THENPOKE36879,VAL(F$)+7:RX=8-RX:GOTO179
188 CC=VAL(I$)-1:CH=CC:I$=""":RETURN
191 POKE36874,(PEEK(36874)+75)ANDD255
194 GETI$:IFI$<"1"ORI$>"8"THEN191
197 CC=VAL(I$)-1
200 GOTO58
203 RX=PEEK(PC)AND15OR(16*0):IFPEEK(PN)=32THENRX=CC
206 OX=PEEK(PC-MV)AND15OR(16*0)
209 RETURN
212 POKE56,28:POKE657,0
215 POKE36866,22:POKE648,28:FORJ=217TO228:POKEJ,156:NEXT:FORJ=229TO240:POKEJ,157
:NEXT
218 POKE36879,25:PRINT"■■■■■LOAD NEXT PROGRAM NOW":PRINT"■■■YOUR PICTURE IS STI
LL"
221 PRINT"■■IN MY MEMORY IN CASE":PRINT"■■YOUR WORRYING":NEW
224 CN=(ASC(I$)AND63)+(ASC(I$)AND128)/2+RV*128:POKEPS,CN:RETURN
```

ter at any time simply by pressing the desired graphic, using the Shift and Commodore keys where necessary. Pressing the Ctrl key will toggle between reverse and normal characters.

For colour changes use f4 and a number for screen and border, and f2 and a number for the cursor, and you can toggle between drawing and moving modes using the back arrow key at the top left of the keyboard.

If you want to start again just press the Clr key. Finally, to convert your drawing to a self-contained program of PRINT statements, press Shift and Inst/Del then load the 'Liner' program. Your picture will remain in memory.



```
100 POKE36879,27:PRINT"■■■LINER & DELETE PROGRAM":GOTO200
110 IFPX(Z-1)=59THENZ=Z-1
120 PX(Z)=19:PX(Z+1)=34:PX(Z+2)=59:Z=Z+2:RETURN
200 PRINT"■■■PLEASE DO NOT TRY TO"
210 PRINTTAB(6)"■■ STOP ME. "
220 PRINT"■■■WAIT UNTILL YOU SEE
230 PRINT"■■■MY CURSOR SHOWING"
240 PRINT"■■■■PRESS '■PRPRCE■' KEY"
250 PRINT"■■■INTO ■STARTS ME OFF"
280 WAIT197,32:WAIT197,64:PRINT"■";POKE36879,137
290 POKE36866,150:POKE648,30:FORJ=217TO222:POKEJ,158:NEXT:FORJ=229TO240:POKEJ,15
9:NEXT
292 POKE56,29
294 POKE54,29:POKE828,PEEK(45):POKE829,PEEK(46):POKE46,PEEK(54)-4:POKE45,0:CLR
295 Q=256■PEEK(829)+PEEK(828):FORX=Q-4TO0STEP-1:IFPEEK(X)>0THENNEXT
296 IFPEEK(X-2)=8THENX=X-2:GOTO295
297 LI=256■PEEK(X+4)+PEEK(X+3):LI=LI■INT((LI+14)/13):DIMPX(100),LX(22):Q=Q-2
299 FORT=0TO7:READT(T):NEXT
301 DATA144,5,28,159,156,30,31,158
303 FORX=0TO23:FORY=7701+22■XTO7680+22■XSTEP-1:LX(X)=■:IFPEEK(Y)<>32OOTO307
305 NEXTY:LX(X)=0
307 NEXTX:FORX=0TO22:PX(3)=INT(LI/256):PX(2)=LI-256■PX(3):LI=LI+10
309 PX(4)=153:PX(5)=34:Z=6:IFX=0THENPX(6)=147:PC=38400:GOSUB365:PX(7)=T(A%):Z=8
311 FORY=XTO22:IFLX(Y)=0THENNEXTY:X=23:LI=LI-10:GOTO349
313 IFY>XTHENFORZ=ZTOY+Z-X-1:PX(Z)=17:NEXTZ:X=Y
315 W=7680+22■X:PC=38400+22■X
317 ES=W:IFPEEK(W)=32ANDMCLX(X)THENFORY=1TOLX(X):IFPEEK(Y)=32THENES=Y:NEXTY
319 IFES-W<900TO329
321 IFZ=6THENZ=5:GOTO325
323 PX(Z)=34:Z=Z+1
325 PX(Z)=166:ES=ES+1-W:PX(Z+1)=INT(ES/10):PX(Z+2)=ES-10■PX(Z+1)+48
327 PX(Z+1)=PX(Z+1)+48:PX(Z+3)=41:PX(Z+4)=34:Z=Z+5:W=W+ES:PC=PC+ES
329 IFPC>38400THENPC=PC-1:GOSUB365:W=W%:PC=PC+1:GOSUB365
331 IFPC>38400THENIFRX%■X%THENPX(Z)=T(R%):Z=Z+1
333 IFV=0ANDPEEK(W)>127THENV=1:PX(Z)=18:Z=Z+1:GOTO337
335 IFV=1ANDPEEK(W)<128THENV=0:PX(Z)=146:Z=Z+1
337 N=PEEK(W):PX(Z)=64+(NAND63)-(NAND32)■2+(NAND64)■2:'Z=Z+1:W=W+1:PC=PC+1
339 IFZG610RWDLX(X)OOTO345
341 GOSUB355:PX(3)=INT(LI/256):PX(2)=LI-256■PX(3):LI=LI+10
343 PX(4)=153:PX(5)=34:Z=6:GOTO317
345 IFWC=LX(X)OOTO317
347 ONSGN(LX(X)-7701-22■X)+2OOSUB359,355,355
349 V=0:POKE214,X:PRINT:PRINT"■■■(DONE)■";:NEXTX:POKE0,0:POKE■+1,0:POKE829,(Q+2)/
256
351 POKE828,Q+2-256■PEEK(823):POKE36879,27:PRINT"■■■FINISH LINE NO.="LI-10
353 POKE45,PEEK(828):POKE46,PEEK(829):CLR:GOTO485
355 IFV=1THENV=0:PX(Z)=146:Z=Z+1
357 PX(Z)=34:PX(Z+1)=59:Z=Z+2:GOTO360
359 IFPX(Z-1)=32THENPX(Z)=34:Z=Z+1
361 IFX=22ANDPX(Z-1)=59THEN60SUB370:GOTO363
362 IFX=22THEN00SUB110
363 H=0:Z=Z+1:PX(1)=INT(H/256):PX(0)=H-256■PX(1):IFPX(1)>PEEK(46)GOTO570
364 PX(2)=0:FORV=0TOZ:POKEQ+V,PX(V):NEXTV:Q=Q+V:RETURN
365 AX=PEEK(PC)AND15OR(16■0)
367 RETURN
370 IFPX(Z-1)=59THENZ=Z-1
371 Z=Z-3:AX=PEEK(8185):A$=STR$(AX):A$=RIGHT$(A$,LEN(A$)-1):PX(Z)=19:PX(Z+1)=34
372 PX(Z+2)=59:PX(Z+3)=58:PX(Z+4)=151:PX(Z+5)=56:PX(Z+6)=49:PX(Z+7)=56:PX(Z+8)=5
3
373 PX(Z+9)=44:Z=Z+9:AX=LEN(A$):FORT=1TOAX
375 PX(Z+T)=ASC(MID$(A$,T,1))
377 NEXTT:Z=Z+AX+1
378 PX(Z)=58:PX(Z+1)=151:PX(Z+2)=51:PX(Z+3)=56:PX(Z+4)=57:PX(Z+5)=48:PX(Z+6)=53
379 PX(Z+7)=44:Z=Z+8
380 AX=PEEK(38905)AND15OR(16■0):A$=STR$(AX):A$=RIGHT$(A$,LEN(A$)-1)
384 PX(Z)=ASC(A$)
386 Z=Z+1
390 RETURN
485 POKE36879,154:PRINTCHR$(142)"■■■■ DELETING PICTURE PRO"'PRINTSPC(7)"■PROGRAM
"
486 PRINT"■■■WAIT UNTILL":PRINT"■■THE READY AND CURSOR■ ■■APPEARS"
490 FORX=256■PEEK(44)+PEEK(43)TO256■PEEK(54)+PEEK(53):IFPEEK(X)>0THENNEXT
495 IFPEEK(X+3)=43ANDPEEK(X+4)=2THENPM=X+1
500 IFPEEK(X+3)<>58ORPEEK(X+4)<>2THENNEXT
505 FORY=X+5TO256■PEEK(54)+PEEK(53):IFPEEK(Y)>0THENNEXTY
510 Z=Y+1:Q=256■PEEK(46)+PEEK(45):W=256■PEEK(44)+PEEK(43):FORX=Z-1TOQ
515 IFPEEK(X)>0THENNEXT
520 H=256■PEEK(X+2)+PEEK(X+1):IFH=900TO530
525 H=H+W-Z:POKEX+2,H/256:POKEX+1,H-256■PEEK(X+2):X=X+4:NEXT
530 PT=Q+W-Z:POKE829,PT/256:POKE828,PT-256■PEEK(829):Z=Z-W
535 POKE831,Z/256:POKE830,Z-256■PEEK(831):POKE832,PEEK(43):POKE833,PEEK(44)
540 EX=256■PEEK(50)+PEEK(49)+2:POKEEX-1,0:FORX=EXTOEX+149:POKEX,PEEK(X+PM-EX)
545 NEXT:POKEX,0:POKEX+1,0:POKE44,EX/256:POKE43,EX-256■PEEK(44):X=X+2
550 POKE66,X/256:POKE65,X-256■PEEK(66):POKE45,PEEK(65):POKE46,PEEK(66):RUN
555 FORX=256■PEEK(829)+PEEK(828)TO256■PEEK(833)+PEEK(832)STEP-1
560 POKEX,PEEK(X+256■PEEK(831)+PEEK(830)):NEXT:POKE44,(X+1)/256
565 POKE43,X+1-256■PEEK(44):POKE45,PEEK(828):POKE46,PEEK(829):CLR:END
570 POKEQ,0:POKEQ+1,0:POKE829,(Q+2)/256:POKE828,Q+2-256■PEEK(829)
575 POKE45,PEEK(828):POKE46,PEEK(829):CLR:PRINT"■"
580 PRINT"■■■■ MEMORY FULL.  PROGRAM CANNOT CONTINUE. ":END
999 REM ****FLAG LINE****
```

SPRITES: A DIY JOB

Keith Hook shows readers how to create a Basic Extension.

Although the Amstrad is a good machine in many respects, it's unfortunate that the Locomotive Basic doesn't support sprites. This is the first of two articles that'll show you how to create your own 'Basic Extension'. Firstly, I shall use a mini sprite handler, and in the final article I shall put the whole thing together to create a real-time game.

A sprite must be able to move around the screen in all directions without destroying the background design, (and if possible move over the background rather than on it).

It is more or less impossible to PEEK the 464's screen, so our extension must have a routine that will overcome this problem so that collisions can be detected.

Since space is at a premium, we shall limit our sprites to a single cell [8×8]. It will not be beyond your capabilities to expand this package to allow 16×16 or even 32×32 sprites which will give your extension far more power.

This article is devoted to the creation of an 8×8 sprite, and adding a new Basic command IPUT,N which will enable you to move the sprite over the screen, in any direction as specified by the parameter N. In the next article I will expand on this by adding a command to read what is on the screen and compare it with a value given in one of the parameters, and expand the IPUT command to control more than one sprite. If you type in listing three you will be surprised to see that sprite movement is so fast that delay loops have to be used to slow the action down.

The program

Amstrad Basic provides for the addition of Basic commands in the format:-

|Command, parameter, parameter, ...

The new command must always be prefixed with a '|' which is the elongated version of the colon on the computer keyboard. You can test this by typing 'PUT' <RET>, and you get a syntax error. Now type 'IPUT' <RET>, and the Amstrad responds with 'UNKNOWN COMMAND'.

To make sure the Basic does not reject your new command, the resident ROM must be told that you intend to use this new keyword — this is taken care of in parts A & B of the source listing.

To Log On a new command the routine (see part A) must obey the following format:-

LD BC, Address of Jump Table
LD HL, Address of a 4 byte buffer to be used by ROM
CALL &BCD1
RET

The Jump Table (see part B) must be designed to conform with the following conventions:

Disassembled Basic loader program

```
; Adding a new command to AMSTRAD CPC 464 BASIC.
; COMMAND PUT
;
; SOURCE LISTING
; (C) K.Hook & PCN 1984
;;
;
;
        ORG     42000           ;
        ENT     $               ; Entry from Basic.
; Part A
;
        LD      BC,COMTAB
        LD      HL,BUF
        CALL    &BCD1           ; Log on our new routine to rom.
        RET                     ; Return to Basic.
;Part B
;
COMTAB: DEFW    NMETAB
        JP      PUT
NMETAB: DEFM    "PU"
        DEFB    'T'+&80         ; &80 used by Basic as delimiter.
        DEFB    &00             ; End of table marker.
        DEFB    &00             ; Padding.
;
;Part C
;
PUT     LD      A,(IX+00)       ; See notes
        CP      &00
        RET     Z               ; Return if 1<
        CP      &09
        RET     NC              ; Return if 8>
        LD      (DIR),A         ; Save Direction.
        CALL    &BB78           ; Get Basic's cursor position.
        LD      (BASPOS),HL     ; Save it.
        LD      HL,(POS)        ; Get this routine's csr position.
        LD      (POS1),HL       ; Save it for later.
        PUSH    HL
        CALL    &BB75           ; Move cursor this routine's position.
        LD      A,(FLAG)        ; Is it the first time routine has been
        CP      &00             ; entered ?
        JR      NZ,SKIP         ; If not skip next part.
        LD      A,&FE           ; Marker for routine has been entered before.
        LD      (FLAG),A        ; Save it.
        CALL    &BB9F           ; ### SEE NOTES. ■ Put in Transparent mode.
        CALL    &BB93           ; ### SEE NOTES. ■ Get Ink.
        LD      (INK1),A        ; Save Basic's ink.
        LD      A,(INK)         ; Get this routine's ink.
        CALL    &BB90           ; ### SEE NOTES  ■ Change inks.
        POP     HL              ; Get position.
        JP      REINIT          ; Bypass routine prepare to return.
SKIP:   LD      A,(BASCHR)      ; Put back on screen what was originally
                                ; at last position.
        CALL    &BB5D           ; ### SEE NOTES  ■ Write to screen.

        LD      A,&FE
        CALL    &BB9F           ; &FE = WRITE IN TRANSPARENT MODE.
        CALL    &BB93           ; Get Ink.
        LD      (INK1),A        ; Save it.
        LD      A,(INK)         ; Get this routine's ink.
        CALL    &BB90           ; Change pen to it.
        POP     HL              ; Get this routines csr position.
        LD      A,(DIR)         ; Get direction to move sprite.
        CP      &01             ; Left ?
        JR      Z,LEFT
        CP      &02             ; Left Diagonally & up ?
        JR      Z,LDIAU
        CP      &03             ; Up ?
        JR      Z,UP
        CP      &04             ; Right diagonally & up ?
        JR      Z,RDIAU
        CP      &05             ; Right ?
        JR      Z,RIGHT
        CP      &06             ; Right diagonally & down ?
        JR      Z,RDIAD
        CP      &07             ; Down ?
        JR      Z,DWN
        CP      &08             ; Left diagonally & down ?
        JR      Z,LDIAD
        RET                     ; Return if non of these.
LEFT:   DEC     H
        JR      RESTOR          ; Decrement column position.
RIGHT:  INC     H
        JR      RESTOR          ; Increment column position.
UP:     DEC     L
        JR      RESTOR          ; Decrement Row position.
DWN:    INC     L
        JR      RESTOR          ; Increment Row position.
LDIAU:  DEC     L
        DEC     H
        JR      RESTOR
LDIAD:  INC     L
        DEC     H
        JR      RESTOR
RDIAU:  DEC     L
        INC     H
        JR      RESTOR
RDIAD:  INC     L
        INC     H
RESTOR: LD      (POS),HL        ;Save up dated position.
        CALL    &BB87           ; ### SEE NOTES  ■ Check validity of positon.
        JR      C,REINIT        ; O.k won't scroll screen so miss next part.
        LD      HL,(POS1)       ; Original pos before move.
        LD      (POS),HL        ; Make sure POS is changed back too'
        JR      NOTLEG          ; Skip next jump to not legal.
REINIT: LD      HL,(POS)        ; Get up dated position.
        CALL    &BB75           ; Move csr to this position.
        CALL    &BB60           ; ### SEE NOTES  ■ Get character from screen.
        LD      (BASCHR),A      ; Save character.
        LD      HL,(POS)        ; Get position again
                                ; ■ HL destroyed by last routine.
        CALL    &BB75           ; Make sure csr still at right position.
        LD      A,(CHR)         ; Get sprite pattern.
        CALL    &BB5D           ; Write it to screen.
NOTLEG: LD      HL,(BASPOS)     ; Get Basic's original csr position.
        CALL    &BB75           ; And restore it.
        LD      A,&00           ; &00 => Opaque mode.
        LD      A,(INK1)        ; Get Basic's ink back.
        CALL    &BB90           ; Send it to PEN.
        RET                     ; Return to Basic.
        ;
        ;BUFFERS
        ;
POS:    DEFW    &0000
BASPOS: DEFW    &0000
CHR:    DEFB    &00
BASCHR: DEFB    &00
INK:    DEFB    &00
INK1:   DEFB    &00
DIR:    DEFB    &00
FLAG:   DEFB    &00
BUF:    DEFS    &04
POS1:   DEFW    &0000
        END
&A4FE
Pass 2 errors ==> zero.
1984.
```

Jump table:	DEFW Address of New Basic Words JP Basic routine 1 JP Basic routine 2 etc . . . .
New Basic words:	DEFM "MOV" DEFB "E"+£80 DEFM "ROTAT" DEFB "E" + £80 DEFB £00; End of Table Marker.

£80 sets bit 7 of the last character so that the resident ROM can recognise the end of the new Basic Keyword.

Basic extensions can also take on parameters. The parameters are passed to the handling routine via the IX register in the form:-
(IX+00) points to the last parameter and (IX+n) points to the first parameter (see first line Part C).

That's all there is to it! You can add as many new commands as you wish — within the capabilities of memory. One final point on the setting up. The first line of your Basic program that will use the routine must have a MEMORY statement set at one byte less than your routine start address. In the Basic listing supplied, care has been taken to allow enough memory for the Matrix Table to be moved out of ROM.

Your sprite command is |PUT, <DIRECTION> where the direction takes the following form:

```
      3
    2   4
  1       5
    8   6
      7
```

So that |PUT,2 will move the sprite diagonally up and to the right. The source listing for the sprite handler is self-explanatory, but the following explanations will add to the clarity of how it works.

£BB78
Get cursor position.
H => column
L => row
This routine corrupts all flags.

£BB75
Move cursor position.
On entry: H => column
L => row
HL and AF Corrupted on exit.

£BB9F
Change print mode.
On entry if A = Zero => opaque mode
if A = non Zero = transparent mode
HL & AF corrupted on exit.

£BB93
Put current ink into a register.

£BB90
Set ink for writing to value in a register.
HL & AF corrupted on exit.

£BB5D
Write a character contained in a reg to screen at current cursor position.
HL,DE,BC,AF corrupted on exit. Cursor is moved to next locapon.

£BB87
Check if current cursor position will make screen scroll.
IF Carry Flag set => NO

£BB60
Read a character from screen at current cursor position.
Return with character in A.

To use the new extension type in the Basic loader and save it on tape. Load it back into memory by typing CNTRL & Small Enter at the same time (normal run mode).

The program will then automatically go into high memory. You can now load in the 'DEMO.BAS' program and see how the sprite moves.

Whenever you use the extension with another program you must observe the following rules:- POKE &A4EF with row and POKE &A4F0 with column of where you want the sprite to start. POKE &A4F8 with zero. POKE &A4F3 with the character number of sprite. POKE &A4F5 with the ink colour of the sprite.

Make sure that the POKES occur in the first lines of your Basic program — (just follow the format of the demo).

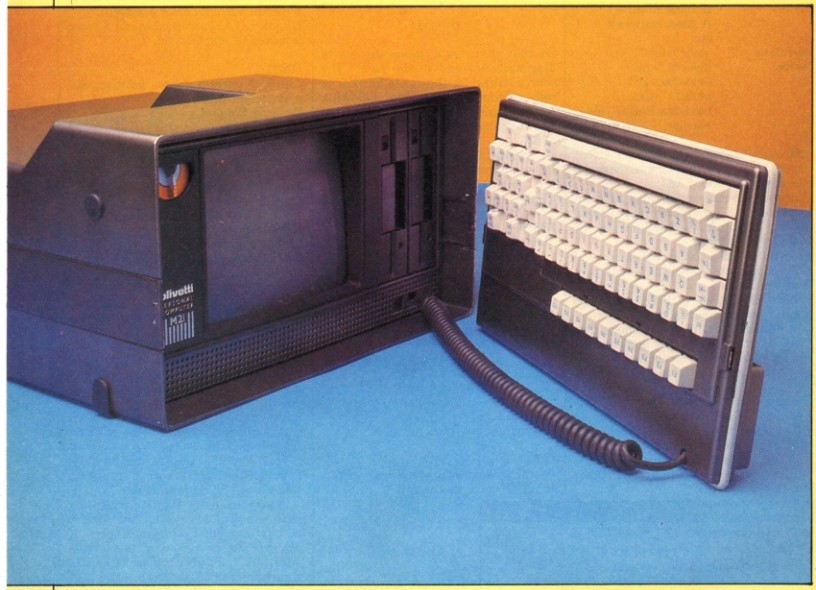
After you have tried this program I am sure you will agree that the idea of adding new Basic commands opens up an exciting new way of using your Amstrad. You'll get a further kick in the final part of this article.

Basic loader program

```
ool ' Basic Loader for "PUT" command.
2 ' Room has been left to allow use of UDG's
3 ' Symbol After,32 is maximum size
4 '
10 MEMORY &A40F
20 FOR CNT = &A410 TO &A4FE
30 READ VL:POKE CNT,VL
40 NEXT
50 CALL &A410
100 DATA &01,&1A,&A4,&21,&F9,&A4,&CD,&D1,&BC,&C9,&1F,&A4
110 DATA &C3,&24,&A4,&50,&55,&D4,&00,&00,&DD,&7E,&00,&FE
120 DATA &00,&C8,&FE,&09,&D0,&32,&F7,&A4,&CD,&78,&BB,&22
130 DATA &F1,&A4,&2A,&EF,&A4,&22,&FD,&A4,&E5,&CD,&75,&BB
140 DATA &3A,&F8,&A4,&FE,&00,&20,&18,&3E,&FE,&32,&F8,&A4
150 DATA &CD,&9F,&BB,&CD,&93,&BB,&32,&F6,&A4,&3A,&F5,&A4
160 DATA &CD,&90,&BB,&E1,&C3,&C5,&A4,&3A,&F4,&A4,&CD,&5D
170 DATA &BB,&3E,&FE,&CD,&9F,&BB,&CD,&93,&BB,&32,&F6,&A4
180 DATA &3A,&F5,&A4,&CD,&90,&BB,&E1,&3A,&F7,&A4,&FE,&01
190 DATA &28,&1D,&FE,&02,&28,&25,&FE,&03,&28,&1B,&FE,&04
200 DATA &28,&25,&FE,&05,&28,&10,&FE,&06,&28,&21,&FE,&07
210 DATA &28,&0E,&FE,&08,&28,&11,&C9,&25,&18,&17,&24,&18
220 DATA &14,&2D,&18,&11,&2C,&18,&0E,&2D,&25,&18,&0A,&2C
230 DATA &25,&18,&06,&2D,&24,&18,&02,&2C,&24,&22,&EF,&A4
240 DATA &CD,&87,&BB,&38,&00,&2A,&FD,&A4,&22,&EF,&A4,&18
250 DATA &18,&2A,&EF,&A4,&CD,&75,&BB,&CD,&60,&BB,&32,&F4
260 DATA &A4,&2A,&EF,&A4,&CD,&75,&BB,&3A,&F3,&A4,&CD,&5D
270 DATA &BB,&2A,&F1,&A4,&CD,&75,&BB,&3E,&00,&CD,&9F,&BB
280 DATA &3A,&F6,&A4,&CD,&90,&BB,&C9,&00,&00,&00,&00,&00
290 DATA &00,&00,&00,&00,&00,&00,&00,&00,&00,&00,&00,&00
```

Basic demonstration program

```
1 ' LISTING 3. BASIC DEMO
10 INK 0,26 'Background white
20 INK 1,6 'Print in red
30 INK 2,0 'sprite will be black
40 BORDER 3,3: CLS ' dark red
50 PEN 1:
60 row = &A4EF:col = &A4F0:char=&AF3
70 flag = &A4F8:sprcol=&A4F5
80 POKE row,1:POKE col,1:POKE flag,0
90 POKE char,250:POKE sprcol,2
100 FOR i=1 TO 25:PRINT "+=@@@@@....*..$.*.**.%.^*...### &***":NEXT
110 |PUT,5    ' display sprite @ 1,1
120 FOR I = 1 TO 1000:NEXT  'delay
130 LOCATE 10,13:PRINT "SPRITE DEMONSTRATION":
140 FOR i=1 TO 25:|PUT,6:FOR T=1 TO 100:NEXT t:NEXT
150 FOR i=1 TO 24:|PUT,2:FOR t=1 TO 75:NEXT t:NEXT
160 FOR i = 1 TO 39:|PUT,5:FOR t=1 TO 50:NEXT t:NEXT
170 :FOR i= 1 TO 24:|PUT,7:FOR t = 1 TO 30:NEXT t:NEXT
180 FOR i = 1 TO 24:|PUT,3:NEXT
190 FOR i= 1 TO 40:|PUT,1:FOR t = 1 TO 50:NEXT t: NEXT
200 GOTO 140
```



OLIVETTI ON THE MOVE

John Lettice casts more than a passing glance at Olivetti's latest offering in the thriving IBM PC compatible marketplace: the M21 portable, sturdy but solid, and little brother to the desk-top M24.

It came in a big black box — the sort you use for burying your mother-in-law in Epping Forest. Naturally, I approached it with some apprehension, first because the box seemed a lot heavier and larger than I'd anticipated, and second because I wasn't all that keen to take delivery of someone else's rotting relations.

But comforting myself with the thought that there have been few instances of micro manufacturers sending journalists bits of dead people, I pressed on, and sure enough found the Olivetti M21 portable, small as life and twice as heavy.

Despite the lack of blood and matted hair the review M21 had clearly been used as the proverbial blunt instrument, and the fact that it still worked was a tribute to its solid construction, and some compensation for its arm-wrenching weight. In its bid for stardom in the IBM compatible market Olivetti is initially concentrating on the desk-top M24, so its little brother the M21 is still a relatively rare bird, and commuting between the world's exhibition centres this particular bird appeared to have soared like an eagle down countless airline steps.

Aside from minor scratches the M21 had lost the flap covering the power cable hatch, and the stand on the base (used to tilt the screen up a little) was badly buckled. Olivetti has taken the latter problem on board and is improving the stand on production models. But, as I say, it still worked . . .

First impressions

The unit is pleasantly compact, especially when placed beside a full-sized PC — both fitted on my desk quite comfortably. The weight is comparable to that of other portables, which is disappointing, but cathode ray tubes always bump up the weight of machines, and if the alternative is making a relatively fragile machine the weightier portable is preferable.

There was no documentation with the review machine, but getting started is simply a matter of flipping back the catches holding the keyboard on, folding that down, removing the cable from its housing and connecting it. From then on you've a standard PC on your hands, to all intents and purposes. You can, of course, use the tilt stand to bring the screen to a more ergonomic angle, but this simply allowed the review model to sink gently back down onto the desk (see buckled stand, above).

Construction

The M21 is among the smallest IBM PC compatible luggables. As far as weight goes, it's comparable to the Compaq — I don't weigh these things, I just compare the length of my arms after I've lifted them — but it's a much more . . . ah . . . compaqt unit, measuring 38.6×21 ×42.5mm.

The keyboard fits across the screen and drives when you're carrying it, but the flip-out carrying handle is on the right hand side, rather than round the back. This means any bashing in transit is taken by the side furthest away from the disk drives rather than, as usual, the screen. Packed up, it forms a steely-grey unit, box-shaped apart from a large recess above the screen.

The styling resembles the M24's, and depending on your point of view is best described as flashy, iconoclastic or horrible. Along the front edge of the console is a grille, forming an intake for the fan, with the same power-on light and reset button as the M24. The twin 360K floppies are vertical just to the right of the 9in screen, and, as you'll see from our photographs, there's a curious yellow circular thing.

The mystery object is actually a twin rotating dial controlling brightness and contrast. No doubt tiring of people saying 'don't think much of your new logo' Olivetti is substituting more conventional dials on later models. Round the back you get RS232, Centronics, power-in, power-out, the business ends of three expansion slots and the fan. The keyboard fits snugly over all this, and is held on by two sliding catches.

In use

Nostalgia time. Once upon a time the Microsoft Flight Simulator was the acid test for a PC compatible. Nowadays anyone producing a compatible makes sure, no matter what else it doesn't do, that it runs the Flight Simulator. No surprises then for finding the M21 runs it, although the 8086-2 CPU means it runs somewhat faster than on the genuine IBM. This particular processor therefore holds a certain amount of fascination for the flight simulator aficionado.

Within the limits of its 128K RAM, however, it seems to run everything else too, and the motherboard has slot space for a further 128K should you need it for one of the newer RAM-guzzling integrated packages. If you need more you can get a 128K expansion board socketed for expansion up to 256K or 348K.

The built-in screen is 9in green on black, with a text resolution of 80×25 or graphics resolution of 640×400, 640×200 or 320×200. It produces anything up to 16 shades of grey, or colours if you have an external monitor connected. You'll need the graphics expansion board for this though. The image produced by the monochrome version is steady and clear, with no obvious ghosting in the lighting I was using it under.

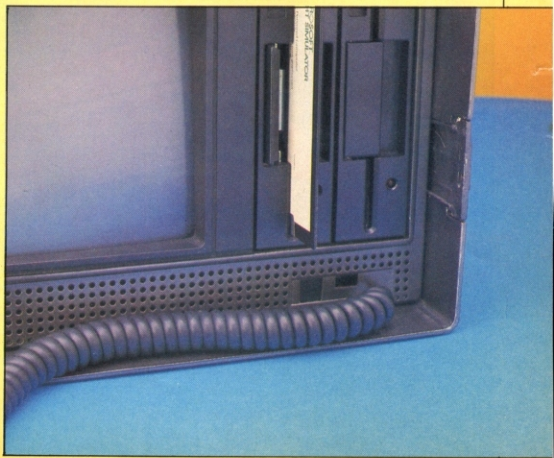
The keyboard is the standard IBM-type format apart from the function keys, which are ranged along the top. The sharp-eyed among you will have noticed that our pictures don't actually show an IBM-style keyboard. But after a brief flirtation with its own format, Olivetti has decided to go for the not so ergonomic but standard IBM version on later models, so our picture is something of a period piece.

The keyboard on the IBM itself has always been something of a curiosity. IBM had used one layout on its electric typewriters, but after extensive research came up with a layout for the PC keyboard that was first different, and second universally reviled. I've used both the Olivetti format and the IBM format extensively, and I'd say the former was better. But, you do run into problems with it, particularly with the function keys, and as a result variations on the IBM format are stifled by the need for total compatibility.

Expansion

In common with its big brother, the M24, the M21 can have the 8087 numeric coprocessor fitted, along with 128K extra RAM on the motherboard. It's also possible to fit a communications adaptor chip internally — I'm not altogether sure what this one does, but if Olivetti would care to supply me with an M21 with one fitted I'm sure I could see my way to finding out . . .

The three expansion slots might seem paltry, but when you consider the machine's built-in facilities three is about right. The rule with IBM's machine seems to be that you always have ▶



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one less slot than you actually need available, and since the M21's standard features actually *are* mostly standard, this problem shouldn't arise.

Here's how it could arise, though. Put in your extra memory expansion board, graphics expansion board, extra comms port, twin serial board (enough here for the first one-PC network) Omninet and Ethernet boards and the Z8000 second processor board, so it can talk to your M20, and you're in trouble. You could say only a lunatic would want all this, but saying this in the papers generally means that said lunatic writes to complain . . .

It's also possible to hook the machine up to an external 10Mb hard disk. Currently there isn't an option to incorporate this in the main unit, as Olivetti doesn't want to encourage people to bend their hard disks by lugging them around too much.

Software

The basic operating system is MSDOS, not overtly PCDOS, and the Basic that comes with the machine is GWBasic rather than the IBM variety. In practice this makes very little difference, as the machine boots up perfectly happily with a PCDOS disk. It does however mean you have to tell the machine the time, despite the fact it's got a battery backed-up clock and knows it already.

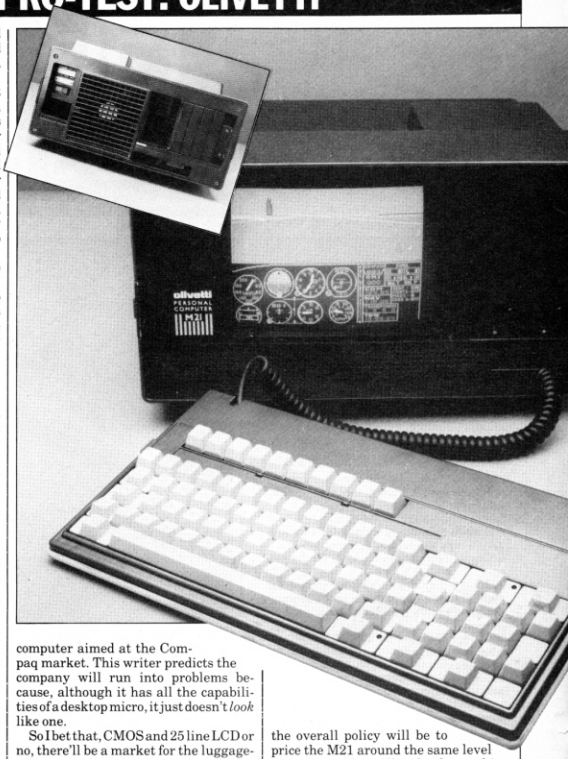
You might have the odd problem if you tried to install a PC program with the Olivetti system disk (I know I did) but you can always install it on a PC and use PCDOS, or if you must use the Olivetti system you'll just have to buy the Olivetti variant of the relevant program.

You can also use the UCSD p-System or PCOS, the latter being the operating system used by Olivetti's earlier M20 machine. In this case you'll need an external 12in display and the Z8000 board, but the facility is really only there to provide support for earlier Olivetti customers.

Verdict

Ever since the advent of the Osborne 1, the luggable/portable has played an odd role in the demonology of computing. The problem is that the Osborne's popularity was based more on a perceived image of portability than actual portability. Sure you could pick it up in one hand, but no way did you want to, and its humpability in total was precious little different from that of allegedly desktop machines.

So the Osborne sold on the *idea* of portability, and on the notion of a neat and compact unit. This philosophy has been carried over to the PC compatibles, to the extent where people are buying Compaqs they have no intention of moving further than the rear edge of the desk. Meanwhile Osborne, without its original Adam, is launching the Osborne Encore, a genuinely portable computer aimed at the Compaq market. This writer predicts the company will run into problems because, although it has all the capabilities of a desktop micro, it just doesn't *look* like one.



So I bet that, CMOS and 25 line LCD or no, there'll be a market for the luggage-rack desktop of the Compaq/Olivetti breed for some time yet. Ranged against its chosen competitors the M21 doesn't come off at all badly. It's compact, rugged and makes the break from many of its portable rivals by not looking like a medium-sized cistern.

At the time of writing the price of the machine hadn't been determined, but the overall policy will be to price the M21 around the same level as the M24. This will make the machine competitive with IBM's PC and probably just a little more expensive than the Compaq.

So if you want a smaller than usual unit, and if considerations of software and hardware support looms fairly large, it's certainly a machine to consider.

SPECIFICATIONS

Price	TBA
Processor	8086-2
ROM	16K bootstrap
RAM	128K
Screen	80×25, 40×25 text 640×400, 640×200, 320×200 graphics, up to 16 colours
Keyboard	83 key IBM format
Interfaces	RS232 and Centronics
O/S	MSDOS
Distributor	British Olivetti, (01) 785 6666

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SCIENCE

Physical Constants – Planck, electron mass, electron charge, Rydberg, Gravitation, Avogadro, speed of light, sound. Gas constant, permeability, permittivity, earth radius, Bohr radius, Astronomic unit, etc.
Conversion Factors – UK to MKS etc.
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Integration Under a Curve
Least Square Fit
Solution of Polynomial Equations

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MATHEMATICS

Bessel – functions
Polynomials – solutions of equations
Matrices – solution of matrix equations, Eigenvalues
Integration – under a curve
Curve-fitting – least squares
Statistics – mean, standard deviation, Chi-squared

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QUEST OF A LIFETIME

Bob Chappell treads the thorny path to find a maze-ful of adventures, which he says are pretty good.

Finding your way around adventures can be a problem, but for some people an even bigger problem is finding good adventures to play in the first place, particularly if you've just bought a new machine. J Wells of Stafford has just taken delivery of a BBC Model B, and writes asking if *PCN* could recommend a few good adventures to play on it.

No BBC adventurer's collection would be complete without a selection from Acornsoft's range. The best two are probably *Philosopher's Quest* and *Castle of Riddles*, both by Peter Kilworth, *Countdown to Doom* and *Kingdom of Hamil* are also pretty good value.

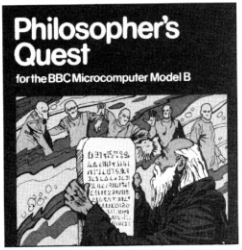
Philosopher's Quest

Philosopher's Quest is choc-a-bloc with teasing problems and has a nice line in humour. Adventures, you may have heard, are for the more intellectual micro enthusiast, and if you're the sort of intellectual who likes being swallowed by a whale, pestered by an old lady, groped by an octopus and struck down by a piece of gorgonzola this one's for you.

Castle of Riddles

Castle of Riddles has a similar line in humour, and contains the Giant's Shooting Gallery, which is one of the most testing problems I've come across. You should also watch out for the smoke-puffing little dragon — this has the frustrating habit of picking up anything you care to drop in the jet black maze.





Infocom

Infocom is the subject concerning A Richards of Woodford. 'I seem to have heard a lot about a company called Infocom which specialises in adventures,' he writes. 'Can you give me any information about it and tell me if its programs are available on cassette?'.

Infocom is a US company, but fortunately its adventures are now available in the UK. That's the good news. The bad news is that the adventures are only available on disk, the reason for this being that each of the adventures is truly massive — far too big for the 64's memory.

By using disks the whole program doesn't have to reside in memory at once. Instead the core program can call up any part of the database from the disk as and when it requires it, and though you pay a little in terms of speed of retrieval it is well worth it for the rich detail of the descriptions, the scope of the program's vocabulary and the wide variety of responses. For this reason, even given improvements in the art of data compression, it seems unlikely that you'll be able to get Infocom adventures on cassette in the near future.

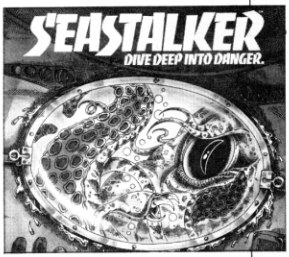
As far as quality goes there's very little to touch an Infocom yarn, and the *Zork* series has been the company's most notable success. This trilogy has topped the US charts since its release a few years ago.

Until recently you would have had to pay £30-£40 for each section of *Zork*, but Commodore has recently made a deal with Infocom that brings the price down to around £12 per game. *Zork* is probably the best reason for getting a disk drive for your 64.

Other superb Infocom adventures include *Deadline* and *The Witness*, where you have to solve a crime using interrogation and deduction; *Starcross*, *Suspended* and *Planetfall* (all science fiction — the latter being refreshingly light-hearted); *Infidel*, and the very latest in a new *Zork*-like series: *Enchanter* and *Sorcerer*.

Level 9

Atari adventures don't get much coverage in the micro press, but there are still some available. L Cobie of Norwich would like to know more — his wish is our command. Level 9 produces some smashing adventures for a whole range of micros, including the Atari, Commodore 64, Spectrum, BBC and Oric. These are the next best thing to Infocom's — they have very detailed descriptions, splendidly testing puzzles, a large number of locations and a comprehensive vocabulary. And they're also available on cassette.



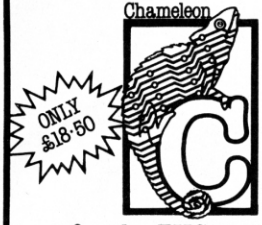
Clever programming means that Level 9 has managed to squeeze some really big adventures into memory without sacrificing too much in the way of detail.

Dungeon Quest, *Adventure Quest*, *Snowball* and *Lords of Time* (the latest, offering nine different time zones to puzzle in) are notable among the range, which also includes a version of the *Colossal Cave* called *The Colossal Adventure* — the latter is by far and away the best implementation of this classic around.

Other top Atari adventures you might care to sample include any of Channel 8's Mysterious Adventures, examples being *Circus*, *Empire of the Overmind*, *GFS Sorceress* and *Earthquake San Francisco*.

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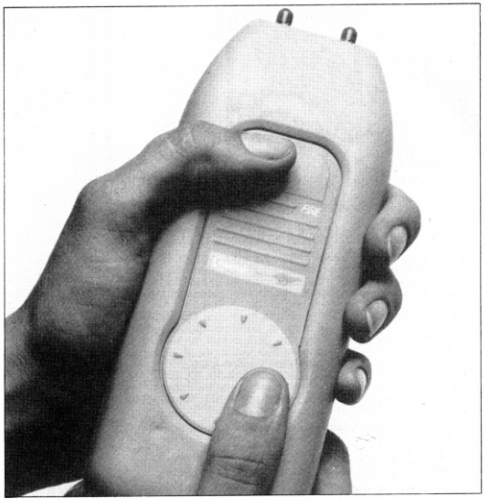


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REMOTE CONTROL RAT

This joystick alternative for the Spectrum brought little joy for David Lester



If you were thinking of throwing away your joystick, for Cheetah's new infra-red device — think again. Because the Remote Action Transmitter, code name the *RAT*, is not up to scratch.

Presentation

It is a small, grey piece of plastic that looks like a pocket torch, and nothing like a joystick. There are no wires to connect it to the interface since the 'revolutionary' aspect is the fact that the RAT is infra-red. But there is another big difference: instead of the RAT being just a joystick without wires, it is a pressure sensitive pad — yes, that's right, just like the old ZX81 keyboard.

Getting started

Getting started is easy enough — just like using any other joystick. You plug the interface into the rear edge connector on the Spectrum (or Interface 1 or 2), place a battery into the RAT, and you are ready to play. The interface works to the Kempston standard, so that you can use your RAT for most Spectrum games.

Test program

```
10 LET X = 127: LET Y = 88
20 PLOT X,Y
30 IF IN 31 = 1 AND X < 255 THEN LET X = X + 1
40 IF IN 31 = 2 AND X > 0 THEN LET X = X - 1
50 IF IN 31 = 8 AND Y < 175 THEN LET Y = Y + 1
60 IF IN 31 = 4 AND Y > 0 THEN LET Y = Y - 1
70 GO TO 20
```

But in case you don't have any Kempston compatible games yet, you can try out your joystick with the test program.

When you run the program above, a cursor will appear on the screen. You can use your RAT to move it around the screen — and it will leave a line behind it, so you can draw with it.

In use

You may have gathered that I was slightly sceptical about the RAT in theory: — in practice my doubts became reality.

The RAT is hard to use, especially in conjunction with the fast-moving arcade games for which it is intended. With a joystick, it is simple to change direction from left to right, or up or down. With the RAT this is not so — you have to find the exact spot on the touch-sensitive pad which performs the required action. And in the middle of an arcade game, this should be the last of your thoughts (after all, if you're on the point of saving Earth from final destruction, you don't want to be hampered with a troublesome controller).

The infra-red part works quite well. There is a wide field for the signals to travel through, so you don't need to worry about pointing the RAT directly at the TV. In addition, it does not interfere with the TV picture, or domestic TV remote control units.

Another pitfall of the RAT is that if you wish to play a two player game, then your RAT will interfere with your opponent's, and vice-versa. What's even worse is that the RAT is battery-powered. Can you imagine it — only one mutant hamburger to go, and then your battery runs out.

Cheetah has released three games along with its RAT. I used one of these, *The Perils of Bear George*, to try out the RAT. The game has some reasonable graphics, but very little else, and only emphasised how clumsy the RAT is. I then changed over to using a normal Kempston joystick, and this made all the difference. With the RAT the game seemed difficult, without it there was no challenge at all. Comparing the RAT to the joystick using other software, the normal joystick won hands down.

Verdict

Cheetah obviously started with a good idea — a wireless joystick. Although I had never experienced any problems with wires in joysticks, it is nice to be able to sit some way away from the computer and still be able to play a game. But the project after that lacks thought.

Joysticks are handy because of their shape, so to return to a ZX81-ish touch-sensitive pad is ridiculous. And to make the RAT battery-powered seems fatal. At this stage Cheetah should call in the Pied Piper to recall all the RATs sold so far and start again.

REPORT CARD

Features	○○●●●
Documentation	○○●●●
Performance	○○○○●
Value for money	○○●●●

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FLEXIBLE FRIEND

Like Peter Worlock, you too can turn your 64 into a serious drawing tool simply by plugging in the Flexidraw light pen and booting up the software.

If there's one subject guaranteed to get computer users drooling it's graphics — high resolution graphics — in colour. (See, you're drooling already.) The Commodore 64 promises better graphics than most micros — but it's difficult to get that promise fulfilled. The lack of any Basic commands dealing with the subject forces you into machine code, or you have to buy the graphics ability as an extra in the form of Basic extensions or dedicated software.

The catch with machine code is that most of us can't be bothered, and those who can lack the programming skill to come up with a really good package. Now from the US comes *Flexidraw*, possibly the best graphics software for the 64.

The second drawback is the keyboard, the lousiest way of generating graphics. Joysticks aren't much better. (Why hasn't anyone produced a mouse for the 64? I'll buy the first one . . .) Light pens are a good compromise so Flexidraw comes with one of the best. The combination of peripheral and software adds up to a superb package.

Features

The light pen is a chunky, matt black affair with a pressure-sensitive tip, so you rarely need the keyboard. Just point and touch the screen. It plugs into joystick socket 1, so setting it up is as simple as can be.

The driving software comes on disk (I think Americans have a phobia about cassettes), along with a bunch of utilities. The main program is Flexidraw itself, of which more in a minute. There are also a number of printer dump programs for most of the popular printers including the 1525, Epsons, OKIs and C-Itohs coupled with various interfaces. I use an Epson RX80 with a Micro Peripherals interface and the software drove the system faultlessly.

Other programs include a sprite designer and animator and music generators, all controlled by the light pen, plus machine code graphics routines that you can use in your own programs.

Flexidraw itself loads in about half a minute, and after a pen calibration routine you're into the main program. Most of the commands are contained in an on-screen menu with further submenus called up as required. Among the many features are the ability to draw by pixel (good for illustration), on an 8 × 8 grid (good for technical stuff), rubber banding, circles, block fills, deletes, cut-and-paste facilities and a zoom function that allows you to work in very fine detail.

But there's a lot more. For example, Flexidraw gives you two high-resolution screens (320 × 200 pixels) and you can swap between them at will. This is put to good use in one of the extra utilities which allows you to call up a set of pre-designed graphics (logic, music, and architectural symbols are included) to one screen, then cut-and-paste them to the second screen.

The accompanying 60-page booklet tells you how to create your own set of symbols making the system a very powerful professional tool for architects, draughtsmen, artists, teachers, students and others. The printer dumps can be normal size or a four-fold enlargement, which produces an image of nearly 8in × 6in.

Finally, a separate program can be called that allows you to colour your creation. The reason for this two-stage operation is that in the highest resolution you are confined to two colours. More colours are available in multicolour mode but horizontal resolution is halved. Using the two-stage system, and some clever programming, Flexidraw gives you the best of both worlds.

Documentation

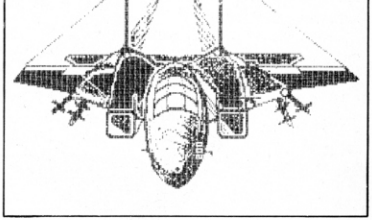
The booklet is little short of superb, covering every imaginable aspect of using the system from setting up to using each of the utilities and ideas for further experiments. There are even sample routines for using some of your creations in your own programs.

In use

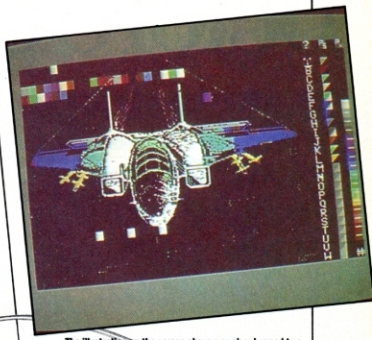
Plug in the light pen, boot the disk with LOAD "*",8 and RUN, and you're off. All options are light pen-controlled so you just touch the answers you want.

The extra programs included on the disk are a mix of genuinely useful utilities and some bits and pieces that serve as demos for the pen harware. Of the good stuff, the sprite designer and animator stand out. The designer itself









The illustration on the screen above was also dumped to a dot-matrix printer, losing the colour in the process (see opposite page).

Basic. Elsewhere you could pay around £15 for this alone and these routines will work on any 64 without the presence of hardware or software.

Those of you with deluxe anti-glare filters who don't want to risk rubbing the screen with the pen tip are catered for too. Holding down the Run/Stop key simulates the switch in the pen so you don't need to actually touch the screen.

In fact, it's difficult to come up with a single criticism of the system. The publisher, Inkwell Systems, has obviously given a lot of thought to the software, then coupled it with high-quality hardware. I tried using the system with a Stack light pen and it just isn't up to the mark.

Verdict

If you need or want a quality graphics system for the 64, Flexidraw gives it to you. With the number of supporting utilities, plus the documentation, it amounts to a complete graphics package that will suit the needs of programmers, designers of any kind and even some artists.

and have them displayed in any sequence you like, thus trying out different combinations to achieve the kind of slick movement that separates the best games from the also-rans.

The music programs are no more than a novelty. Playing on-screen notes with a light pen is like playing a real keyboard with a walking stick.

Of more benefit is Transgraph — one for you communique junkies with modems and the like. Transgraph will transmit your high resolution pictures over the phone lines so you can impress like-minded and similarly equipped friends.

Last but by no means least, a neat and useful collection of graphics routines that you can include in your own programs. They're all in machine code and used with SYS calls, giving you access to such desirable graphics facilities as PLOT, DRAW, CIRCLE and all the set-up code that takes an age to do in

Name Flexidraw **Publisher** Inkwell Systems **System** Commodore 64 with disk drive (printer recommended) **Price** £140 **Distributor** Tomorrow's World Today, 32 Oxford Street, London W1.

REPORT CARD

Features	●●●●●
Documentation	○●●●●
Performance	●●●●●
Value for money	○●●●●

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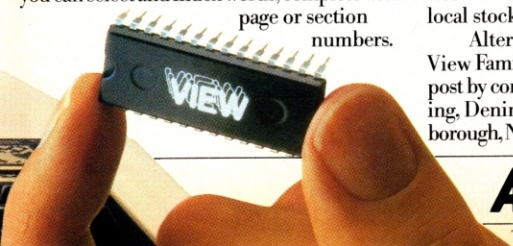
And it's so outstanding it's won the 1984 British Microcomputing Award for Home Software.

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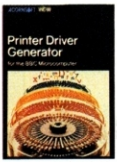
VIEW can search, change and replace particular words whenever they occur in your text. It can swap paragraphs. Automatically alter page numbers. Even count words.

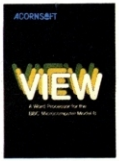
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And of course, when you're ready, any printer that will operate with your BBC Micro will operate with VIEW. But if you want to use the printer's special facilities, such as bold printing or underlining, Acornsoft's Printer Driver Generator (£9.95 on cassette, £11.50 on disc) enables you to do so.









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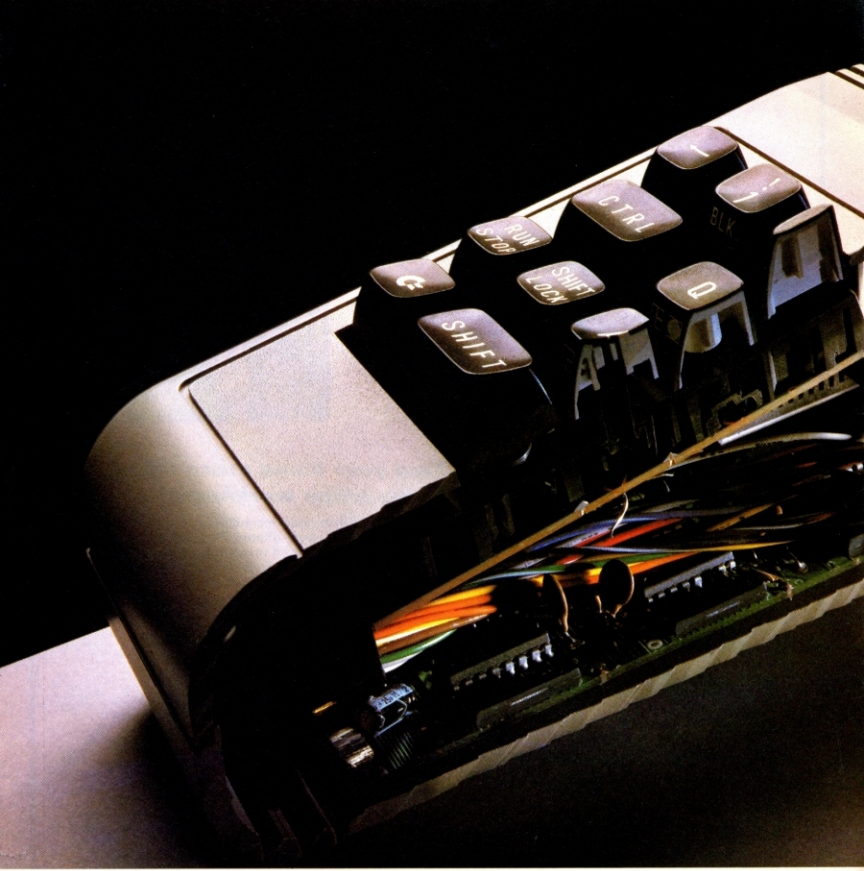
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Electron cassette	£5.95 ☐	£5.95 ☐	£8.95 ☐



Are you only using

To only play games on a Commodore computer is like asking Albert Einstein to work out the square root of four.

The computer's brain barely ticks over.

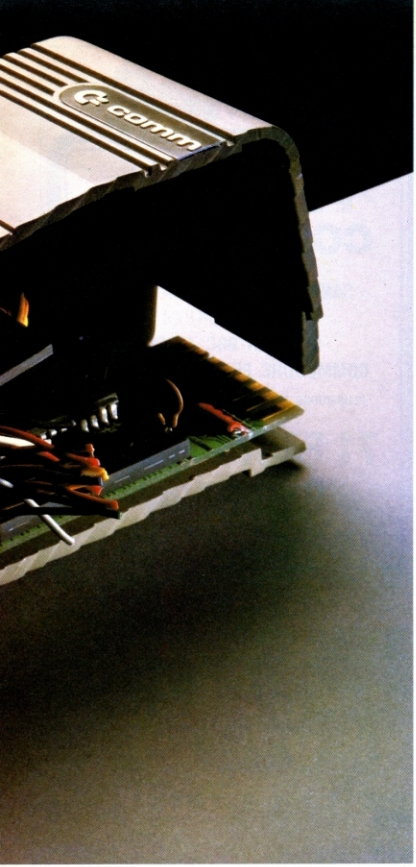
To really stretch it, you need more interesting software programs. For example, record keeping, interactive education, stimulating adventure games or word processing.

And for those you need peripherals.

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Or a Commodore cassette unit, the inexpensive way of loading and storing programs.

For those who like the idea of text and graphics being more alive and having greater clarity than on a TV, there's the Commodore colour monitor.





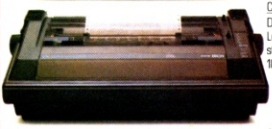
COMMODORE MPS801
Dot matrix printer. £230.00. Tractor feed. Print speed: 50 characters per second.



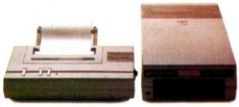
COMMODORE MPS802
Dot matrix printer £345.00. Friction feed for standard paper. Print speed: 60 characters per second.



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SOFTWARE PRE-VIEW



We take a peek at the new software packages, and give you a taste of things to come. Note to software publishers: If you wish your company's product to be included, please send only the very latest releases to *Bryan Skinner, Software editor*, PCN, *62 Oxford Street, London W1A 2HG.*

Please don't forget to include prices and telephone numbers.

BBC



Lingo is a word game with a difference. Several players take turns at selecting from a pool of words and letters to make up sentences. Players may be challenged and the game's slogan 'It makes Fun of the English Language' is ambiguous.

Jump Challenge will be released simultaneously on a number of micros. It's a simulation of Eddie Kidd's stunt biking — leaping over vehicles and the like. There's a competition associated with the game — you get an entry form and a serial number which could win you either a BMX bike or computer.

Lingo	**£12.95**	**CMS 01 387 9503**
Jump Challenge	**£7.95**	**Martech (0323) 768456**
Spaceman Sid	**£7.95**	**English Software 061-835 1358**

DRAGON



Back Track uses very good graphics, for the Dragon. Eddie has been captured by a mad professor and must take tests in mazes before he can escape. To be avoided are the sleepy snakes and the professor's mutated rug. Eddie's willpower can be increased by taking fruit, but is sapped by the skeletons of previous victims. Recommended.

Back Track	**£6.50**	**Incentive (0734) 591678**
Masterstroke II	**£6.95**	**PiKaDee, 35 Parker St., Preston, Lancs**
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Timebomb	**£4.95**	**Harlequin 061-499 1707**
Derelict	**£7.95**	**Harlequin 061-499 1707**

COMMODORE 64

Supabasic, from Interceptor Micro's, offers 72 extra Basic words, covering hi-res graphics with sprite handling, and extensive sound/music commands. Basic functions like renumbering and function definitions are also catered for. What's nice about it is it bridges the gap between toolkits and sound/graphics aids.

Star Trader is more than a straight conversion of the Spectrum game, released by Bug-Byte earlier this year. Your role is that of a space pilot; your task to amass money travelling around the galaxies fighting off pirates. The game is a simple version of the BBC game, *Elite*.

Sherlock	**£14.95**	**Melbourne House 01-940 6064**
Zim Sala Bim	**£9.95**	**Melbourne House 01-940 6064**
Games Creator	**£12.95**	**Mirrorsoft 01-822 3800**
Supabasic	**£9.99**	**Inteceptor Micro's (07356) 71145/3711**
Ah Diddums	**£5.50**	**Imagine 01-567 9710**
Jump Challenge	**£7.95**	**Martech (0323) 768456**
Combat Lynx	**£8.95**	**Durell (0323) 768456**
Black Knight	**£11.95**	**Interdisc 01-969 6498**
African Safari	**£11.95**	**Interdisc 01-969 6498**
Turbo 64	**£7.95**	**Limbic Systems (0993) 812700**
Firequest	**£9.95**	**The Edge 01-240 1422**
Star Trader	**£7.95**	**Bug-Byte 051-709 7071**
Mr Freeze	**£2.50**	**Firebird 01-357 3814**
Booty	**£2.50**	**Firebird 01-357 3814**
Headache	**£2.50**	**Firebird 01-357 3814**

SPECTRUM



The multi-games release from Firebird is interesting because this is British Telecom's new software publishing arm. The prices are also of interest to us market watchers — £2.50 neatly straddles the average Spectrum games price of £5 to £7 and the budget games at £1.99. A nice touch is that the inlays have a colour picture of a screen from the game. Reviews of *Booty* and *Headache* are on the way, and our general impression is that the range promises good quality software at a low price.

With Mastertronic's latest release, *Chiller*, it marks the beginning of a games price war. Publishers of low-quality software, will go to the wall, and we'll see two types of games — the cheap, but competent and occasionally very good, and the expensive, but superb.

Worlds at War will be released by the new software house Esteem More than Equal (whatever that means). The game, we're told, is written in 'high-speed machine code'. Does this mean it'll be that much better than all those slow-speed machine code programs we're so used to? It takes the form of three chapters, each being an arcade sequence and the company states that 'all three chapters represent the best value for money ever seen for a computer game . . . we guarantee it'. Heady stuff. Launch date is October 1. We'll let you know what the game's really like as soon as we've seen it.

Sherlock will be our Star Game shortly — it's a complex adventure with graphics and is very well done indeed. *Hampstead* is another adventure, with the aim of making progress up the social ladder to the dizzy heights of that London residential area.

Watch these pages for reviews of Micromega's latest, also new games from The Edge, Firebird and Silversoft.

Hampstead	**£9.95**	**Melbourne House 01-940 6064**
Sherlock	**£14.95**	**Melbourne House 01-940 6064**
Kentilla	**£6.95**	**Micromega 01-223 7672/7904**
Braxx Bluff	**£6.95**	**Micromega 01-233 7672/7904**
Music Typewriter	**£9.95**	**Romantic Robot 113 Melrose Ave., NW2**
3D Designer	**£4.95**	**Matrix Software Tamworth 60148**
Psytraxx	**£7.95**	**The Edge 01-240 1422**
Starbike	**£6.95**	**The Edge 01-240 1422**
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Megasub Command	**£2.99**	**NTD Software 01-736 9009**

Trans-Express

David Janda takes a cool look at a mail order package of utility programs for the Sinclair Spectrum

Trans-Express from Romantic Robot is a suite of programs that enable you to perform four types of backup operation with your Microdrive and cassette. They are: tape to tape, tape to Microdrive, Microdrive to Microdrive and Microdrive to tape. As far as the Microdrive operations are concerned, one drive is all that is necessary to use a particular feature.

The idea behind a backup medium such as the Microdrive is to give you greater flexibility in using the Spectrum. One of the benefits is file handling which cannot be done with cassette. But the biggest advantage is the speed at which programs can be saved to and loaded from the Microdrive.

The naive Spectrum user may wonder what use this type of utility has. After all, it's a simple operation to transfer programs between cassette and Microdrive, isn't it? Well it's not. The fact is the user can have great problems in transferring programs (even their own). This is due to the crummy Microdrive filing system as well as the different syntax of loading and saving machine code and worst of all, programs with multiple parts and position dependent code.

At this point it is worth pointing out that Trans-Express will copy commercial programs. Now many say this is an offence and not to be done. Indeed, Romantic Robot, which produces Trans-Express, clearly warns anyone that the package must not be used to infringe copyright.

Features

Probably the best feature of the package is its ease of use.

You could be forgiven for thinking that the transfer operations the package performs are simple. But this is because they are all automatic. At no time is it necessary to scribble down start addresses and such like.

Transferring programs from tape to Microdrive is very simple, yet the checks are not. If necessary, Trans-Express will relocate Basic and machine code, as well as search and change any file handling commands that are in Basic or machine code. Headers and program length are thoroughly checked and altered if necessary, and multiple part programs can also be transferred.

Microdrive to Microdrive is a little deceptive in its title because it can perform all functions just as well if you have only one drive. A whole cartridge can be backed up by the press of a button, and this includes program files which are not the easiest to transfer, *ie* Basic. Microdrive users will be aware of how access time increases after a cartridge has been used frequently. This is because the files are 'scattered' over the cartridge. Transferring selected files using Trans-Express saves them sequentially, thus considerably decreasing access time. It is also possible to erase and overwrite exisiting files.

The tape to tape facility allows programs with multiple or single parts to be transferred. A program of up to 40K can be transferred in one go using Tape to Tape, and for larger programs up to 48.4K, Supertrans is used. False headers and such like are handled without any trouble.

The final part of the Trans-Express package is the Microdrive to Tape transfer. There probably isn't too much call for it except as an invaluable way to archive cartridges onto another medium. No modification is made to the programs as they are transferred to tape, so it can only be used for backup purposes.

In use

The copy of Trans-Express reviewed was supplied on tape, but at the time of writing a cartridge version was made available. The only real difference is that the Microdrive to Microdrive incorporates a format function as well as an easier to use delete operation.

Unlike most back up tapes there are no complex operations which require the user to note down addresses and so on. The menu-driven software is very straightforward.

Verdict

Backing up programs and data or simply transferring them is a boring task that should not be made any more complex. The real asset with Trans-Express is that practically all operations are automatic, and those that are not 'guide' you through. Highly recommended.

User interface

Trans-Express consists of several programs that run on 16K and 48K Spectrums. The programs are preceded by a front panel menu which invites the user to select the operation required. Once selected, the program searches for the required part, loads it and runs automatically.

Depending on which operation is chosen, different types of information are displayed. Microdrive to Microdrive provides a detailed catalogue of the Microdrive cartridge. Information displayed includes details on file position (sector number), length, file type, file, cartridge name and remaining amount of memory.

Files for transfer or deletion are selected by using the cursor keys to move the cursor to the desired file, then pressing 's'. A number of files can be selected this way and they will be transferred in order.

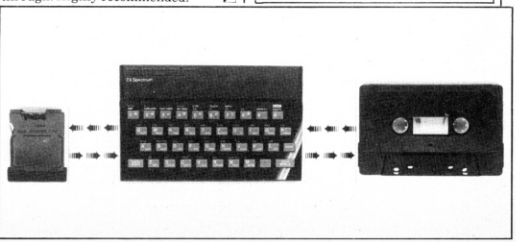
The second type of display is the two line status report used in cassette operations. The reason for this is that the screen map is used as a buffer for the file to be transferred. Every operation requires just one key response and these are mainly of the Yes/No variety.

In all operations error trapping is extensive and various error reports are provided. The objective of a user 'buffer' of this type is to make complex operations simple for the user.

REPORT CARD

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Performance	●●●●●
Value for money	○●●●●

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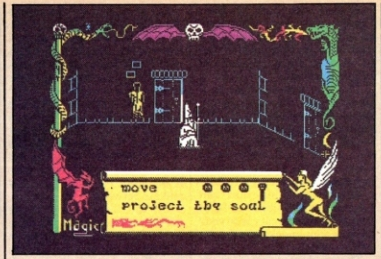
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STAR GAME

SPECTRUM

AVALON



You know *Avalon* is something special from the moment you clap eyes on the first screen. Set in a mystical, magical atmosphere the border alone is impressive. At bottom left there's a red, winged devil, while at the right a white winged human figure helps support the scroll on which game details appear.

At the left there's a serpent coiled round a staff, to the right a green, blue bellied dragon, while at the top a skull holds court. You appear as a white wraith — the astral projection of Maroc the Mage. Your task is to seek out the Lord of Chaos inside the hill of Avalon on the Isle of Glass.

There are choices for Kempston, AGF or Sinclair joysticks, and a fair selection of keys for keyboard control. But this is one of those games where you'll need a stick — or you won't stand a chance.

Beginning as a novice lore seeker you establish control of the wraith by pressing enter twice. The first time is to select a spell from the list shown on the scroll at the foot of the screen, the second to activate that spell. At the foot of the screen a long tongue of flame shows your energy level. And with the ability to only move, off you go on your adventure.

Your viewpoint is always the back wall of each room, Maroc's spirit floats about more or less mid-screen. Its movement is ethereal, a sort of gentle gliding and floating motion, very easy once you get the hang of it. As you move around, so the room's perspective is adjusted. This is very well done indeed.

To pass through a door, you touch the handle, the door swings open and through you go. Best policy here is to drift into it, back off as it opens then glide through. It can be very frustrating at first, when you're continually opening doors, misjudging movement and closing the door as you try to pass through.

On your travels you'll come across various parchments. Collect these like a greedy squirrel — they're spells which will allow you to summon up a servant, freeze any nastys about to terminate your mission and so on.

As you pass over spells they're added to the spell scroll and you can select one by moving an arrow to the spell you want. Also shown on the scroll are a number of tokens which indicate how many more times the spell may be used. Pressing enter again activates the spell.

You'll need the servant spell to gain access to some other spells hidden in chests, and being a projection you lack the necessary corporeal substance to open chests. There are background and foreground spells, background spells continue while you activate other spells, the invisibility spell 'Unseen' is one of these.

One nice thing about being an astral projection is that you can't die — once your energy is sapped you simply start again. When your energy has been drained you ascend to the skies, revolving as you go — just another indication of the attention to detail throughout the game. You can save a game and pick up where you left off.

There are 16 main ranks, from Lore Seeker, through Magician and Warlock to Lore Lord. Each of these is subdivided into eight stages, from Apprentice through Learned to Supreme.

This one's a winner; its good graphics and compulsive action mean it should be in the charts

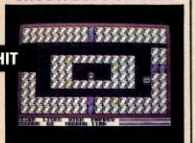
Bryan Skinner

Rating 10/10
Price £7.95
Publisher Hewson Consultants, 0273 693460.

COMMODORE 64

CHOC A BLOC CHARLIE

HIT



It's one thing to rip off an arcade game, giving the world yet another penguin pushing ice-blocks around, but it's quite another matter to take the basic idea and turn it into something new — in this case, something infuriatingly difficult. Charlie's the character you're controlling with keyboard or joystick and he's trying to escape from a warehouse — all 16 screens of it. The place is sealed by a double row of blocks all round the walls, and a further 34 blocks in the middle. There's also a hairy creature haring round the place laying Robot Mines, and Charlie's first job is to push the blocks (one at a time, of course) to seal off the hairy monster.

Then comes the tricky bit. Four of the blocks are purple, and four are gold. The gold ones are merely bonus blocks, offer extra points if you succeed in taking them through to the next screen: but you can only get through to that screen by placing all four purple blocks together. Easy-peasy? Well, behind each purple block is a hostile guard.

This is the kind of game where just releasing one purple block seems like a major achievement, and then you realise you have to do it three more times. Then you lose the last of your five lives and have to start over again. Or you release the hairy monster into your half of the screen.

The only complaint is the difficulty of control, both by keyboard and joystick, as this is one of those games where you have to centre up the character exactly and you spend ages jiggling him backwards and forwards into just the right place. This game exhausted the efforts of myself and some of the PCN team in simply getting out of the first screen.

Mike Gerrard

Rating 8/10
Price £6.95 **Publisher** MC Lothlorien, 0625-876642

COMMODORE 64

GUMSHOE

Raise your bourbon bottle, everyone who ever wanted to be a private eye. Well, here's your chance. Gumshoe is an amalgam of Donkey Kong, Manic Miner and other variations of ladders and platform games but don't let that put you off. It's addictive, full of clever little touches and slick animation.

The scenario is familiar to everyone who's thought the line, 'Here's looking at you, kid.' Millionaire's daughter kidnapped; you, the noble hero, hired to effect the rescue. Having tracked the band to a multi-storey apartment block your ordeal begins, in addition to finding your way through the maze of ladders, laundry chutes, elevators and two-way escalators.

This is the largest kidnap gang in the history of organised crime but your potential reward is good. You start with a retainer of $500 and gain and lose money as you go. The scoring system is just one of the notable features — you earn a $10 bonus for every baddie you gun down, but each slug for the .45 costs you $2. If one of the gang takes you by surprise you enter a bout of fisticuffs — a graphically funny encounter from whirling fists and on-screen 'biffs' and 'zaps'. If you lose, it's the big sleep for one of your five gumshoes. Win and you live to fight another day — but you get docked $150 medical expenses.

There had to be one criticism so here it is — the sound doesn't live up to the graphics.



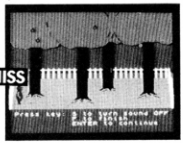
HIT

Peter Worlock

Rating 9/10
Price £7.90 **Publisher** A & F Software, 0706-341111

GAMEPLAY

SPECTRUM



BEAR GEORGE

The *Perils of Bear George* is one of three games which Cheetahsoft is releasing with its new 'joystick', the RAT. In it you play the part of Bear George, and your object is to have a successful hibernation each Winter. You achieve this in stages, in a number of separate screens.

The first screen is set in a forest (well, there are three trees). You have to try and eat as many apples as you can which fall from the trees. As soon as you realise how to go about this, the screen becomes tedious — you can't really fail.

The worst thing that can happen to you is for a squirrel to drop something nasty onto your head, which knocks you out for a few seconds.

The graphics at this stage are quite nice. But they're not as detailed as the picture on the cassette inlay card and advert, which looks like a screen shot. A nice touch to the game is that you can see yourself get fatter as you eat more apples.

The second screen, which you automatically reach after a fixed time, has simpler graphics. Here, the object is to cross a ski-piste, avoiding the skiers. This is no great challenge since the skiers are few and far between.

On the third screen you're inside your cave, and you have to walk to the end without hitting any of the spiders bounding up and down. As with the last two screens, this is more a formality than a challenge, once you know when to move (which might take you five seconds to work out).

Well, that's basically it — as you end up with a picture of a sleeping bear, who on waking, returns to the woods again.

On the whole, the graphics are above average, the first time you see them, and each screen has its own tune. But as a game, this program is hopeless; its lasting appeal is about the same as a ZX81 sound synthesiser program. **David Lester**

Rating 6/10
Price £6.95 **Publisher** Cheetahsoft, (01) 833 4733.

BBC B

SAS COMMANDER

Yet another game with prizes to be won. High scorers in *SAS Commander* stand to win £50 in cash and £20 worth of software. Your task is to save the nation from terrorists, who appear in green shirts and red trousers. There are several pages of background story to wade through if you wish, where 'the' is spelled 'thee' for some odd reason. Controls are simple; 'z' and 'x' for left and right, return to fire. Sound can be toggled on or off, though not during the game. There are three street scenes and ten terrorists to be disposed of before you move on.

The first screen shows a row of buildings as the background, with you as an armed officer in blue tunic and red boots. The graphics are colourful, but very chunky, and the sound is very limited. At this level a single terrorist appears from time to time, in a doorway or window and, after a brief pause, starts firing at you. If you don't move from the centre where you're placed initially, he just carries on firing at you forever — which begins to make you wonder . . . To nail the baddie involves dodging his monotonous fire — not difficult as he's not very accurate in the first place, and is very slow to re-aim — then letting him have it between the eyes. The only dodgy part is that the terrorists take hostages, who appear with their hands up, dressed in blue tops, not too difficult to recognise. Shoot a hostage and that's the end of the game. The terrorists shoot from behind the hostages, so it's just a matter of dodging bullets and waiting for the hostage to turn into a terrorist.

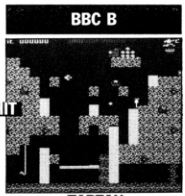
Dull by anyone's standards. Prize or no prize, I couldn't bear



to try beyond level two, where you get two terrorists at a time taking pot-shots at you and the fire is more rapid. **Bryan Skinner**

Rating 6/10
Price £4.95 **Publisher** Comsoft, (0532) 665621.

BBC B



TARZAN

Tarzan is Alligata's latest for the BBC, and it's certainly been worth the wait. There are four levels, and the first's hard enough even for experienced gamesters.

Cast as Lord of the Jungle, your role in life is to save Jane from an awesome fate. To do this you have to pass through or past any number of hazards.

The demo mode which takes over if you're too slow deciding whether or not you can face the game is useful because it gives you some idea of what you're up against and allows you to estimate pathways and tactics.

In the first screen Tarzan's shown as a rather simple white figure wearing a mauve loin cloth. He stands by the trunk of a tree at the bottom left of the screen, faced by a yellow snake which lowers and raises itself from the lower branches. Once past the snake, there's a column of blue which behaves rather like the snake and whereas the snake is deadly, leaping on to the top of the column is the only way through this section. Life's not a bed of roses, for staying on the column all the way to its apex results in a fatal headache for our hero. Leaping to one side lands him on yet another blue column, moving faster than the last, which can be used as a platform for access to other parts of the screen. Stay on this too long and he'll fall off. Higher up the screen, and you'll need some practice even to make that, you'll encounter unfriendly monkeys dropping coconuts on your bonce, not to mention grisly detached snapping heads, deadly bats and the like. Right at the top is the arrow you must pass to the next screen.

Later levels feature monkeys, cheetahs, flying snakes and much more. For the BBC, this is a very good game indeed, even if the graphics are a bit chunky. **Bryan Skinner**

Rating 8/10.
Price £7.95 **Publisher** Alligata, 0742 755796.

BBC B

SINBAD

Sinbad is a mixture of game types. In the first screen you have to leap on to a green rope ladder hanging below a flying carpet. You're shown as a rather chunky figure in green hose, blue top, red hair and a distinctly square nose. The carpet meanders across the screen, dangling that ladder tantalisingly just out of reach. With a carefully timed leap, and by judicious ascent and descent you can touch one of the half-dozen or so things that wave from left to right across the screen. Contact changes the colour of a thing, but makes it malevolent — you'll fall to the ground on contact with one of these changelings.

The accompanying sound is very good — far better than the game itself. Sounding for all the world like an electronic organ, the music comes across as slightly Oriental.

Once you've changed the colour of all the things, you're taken to the next level, where you actually get to fly the magic carpet while massive pulsating blobs of colour come at you out of a multicoloured, star-lit sky. Your aim here is simply to avoid them — not too difficult, though far easier with a joystick. The carpet has an unnerving tendency to accelerate viciously, scudding off the side of the screen, only to reappear on the other on an unavoidable collision course with one of the brightly coloured meteors. Success at this level takes you to the next where the carpet and things are slightly different and the tasks harder: spiders fall from the sky and have to be jumped over while you struggle to gain the ladder again. Higher levels involve essentially the same screens, but with more hazards.

Sinbad is far from brilliant —



not easy, good sound, poor graphics. The idea's quite novel, but the game doesn't go far enough. The game quickly becomes boring. **Bryan Skinner**

Rating 6/10
Price £4.85 **Publisher** Virgin Games, (01) 727 8070.

GAMEPLAY

SPECTRUM

PI-IN-'ERE

Not too long ago we found the intrepid explorer Burt, from Automata, helping to paint in a pyramid in *Pi-Balled*. Burt now finds himself reduced in scale and transported to the inside of a computer where his mission is to track down the elusive Big Bug.

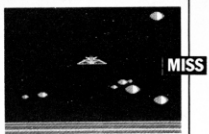
Burt also has to avoid contact with the minor bugs that infect the machine, and if he does happen to touch one of the bugs it's an early grave for him.

Scattered around the numerous levels of the computer are a number of items which Burt must collect. Once all of the objects are collected he will automatically be moved to the next level. There are a number of revolving edit keys scattered around the computer and passing under one of these will cause it to fall, squashing any bug that happens to be too close.

Moving up a level brings a greater degree of difficulty. The monsters tend to get a little meaner: you'll find Burt being chased around the computer by red bugs that can tunnel around the computer after him, white speed bugs, green grabbers and magenta menaces.

Visually *Pi-in-'ere* is good. Our hero Burt is quite large and extremely well animated, and the rotating keys spin very smoothly. The fact that the graphics are large isn't really a good thing, since it means that the playing area is very small and you don't have the room to manoeuvre around the nasties that are chasing you. You also get the normal Spectrum problems with the colours becoming confused when objects get close to each other.

Sound can't really be described as being good. The reverse side of the cassette contains what has now become the standard piece of 'music', of



the same quality as earlier releases by Automata — bad.

Pi-in'ere is not an original game and there are others that are a lot more playable, even if they don't look as good.

Stuart Cooke

Rating: 4/10
Price: £6.00 **Publisher:** Automata, (0705) 735242.

COMMODORE 64

SORCERY



Ghosts, ghoulies and bodyless skulls are your targets in *Sorcery*, yet another arcade adventure, and that's only the front line before you meet the evil Necromancer.

The idea is to progress along numerous screens collecting objects and magic potions while at the same time avoiding the baddies.

The problem is, not only do you have your life span ticking away but you're also using up your energy. And if that wasn't enough you're attacked by ghosts and ghoulies who are trying to prevent you from succeeding in your task.

All this is enough to put the cowardly off before they start but if you're made of stronger material you may well enjoy it.

Your energy level can be built up by sitting on a cauldron but this doesn't affect your time span. Subsequent screens are reached by passing through doors to the left of the picture.

As if the spooks aren't enough, there is also a river in which you'll drown should you fall in (no they don't provide life jackets). The game isn't as easy as it may seem at first because sometimes you can't pass through a door unless you have the appropriate object; finding this is a matter of trial and error.

I never actually reached the end of the game, so I can't tell you if its worth the energy or whether you reach an anti-climax as you defeat the Necromancer, but if the game doesn't have you tearing your hair out the music certainly will.

At times the screen is so full you haven't time to read the statements at the bottom of the display so you may pass through an area not knowing where you have been or what you were holding.

Sorcery isn't a forerunner in the adventure field, but has enough action. **Susan Cooke**

Rating: 7/10
Price: £7.95 **Publisher:** Virgin Games (01) 727 8070.

COMMODORE 64

PIROMANIA

The piman has really done it this time, he's suffering from a bad case of *Piromania* running around making the life of the residents of Automata Towers sheer hell by setting the place alight. Of course the local fire brigade has arrived on the scene and it is up to you to help our hero 'Walter Hose' put the fire out.

The action takes place on a number of floors in a tower block with fire spreading around the place. It's up to Walter to use any means possible to put out the fire. Ladders connect the different floors of the towerblock and there are numerous buckets and fire extinguishers around that he can pick up.

If Walter uses all of the water in his bucket he can also fill it up at one of the stand pipes, and of course, he mustn't forget to close the fire doors to keep the fire contained.

Apart from fighting with flames Walter has to salvage everything possible from the fire, and rescue the occupants of Automata Towers. For every person and item you save you gain points.

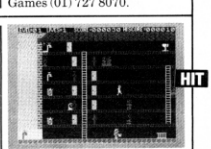
The action is fast and furious, no sooner is one fire put out, another three start.

Grabbing his bucket at the bottom of the screen, Walter must race up and down the ladders throwing his limited supply of water onto the fires.

The occupants rush around the building as if the fire doesn't exist — and it's a job trying to save them.

And what a dancing pink elephant is doing on the top floor of a tower block I'm not quite sure.

Piromania is certainly a fun



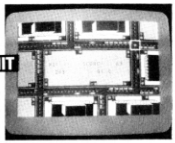
game. With the difficulty increasing each time the building is saved it will take a while to master. Definitely a game for any budding fireperson.

Susan Cooke

Rating: 8/10
Price: £6.00 **Publisher:** Automata (0705) 735242.

COMMODORE 64

TRAFFIC



You'll need sharp eyes and quick wrist movement to keep vehicles on the move in *Traffic*.

You've just been given the tiresome job of controlling the congestion on the streets of London. By using the traffic lights, you must ensure that long queues of traffic don't build up at junctions. To do this you have to move the white cursor to the desired junction, and change the colour of the traffic lights by pressing fire.

If you manage to impress your superiors by keeping the traffic moving, you will be rewarded by being moved to a more congested area. But if your ability to control the traffic is abysmal, then everything will grind to a halt.

Before you get down to the nitty gritty of the game, a little scenario occurs. To the accompaniment of the chimes of Big Ben followed by a snazzy tune — Big Ben rests to the left of the screen, a blinking policeman appears on the right and then on rolls a bus.

Playing the first screen of this game was a cinch once I got to know how the traffic progressed. But things got a bit more hairy as I went through more screens. Each screen has a different layout of roads and, of course, there are more junctions to tackle.

I got as far as screen nine, and while darting around with the cursor changing lights from green to red, or vice versa — I also had to keep an eye out for build-ups at junctions.

If you don't spot a congestion in time, a number flashes in the congested area to the sound of an alarm-type noise — and if you're not quick enough to change the lights everything comes to a halt.

The graphics in this package are quite good. Lorries, cars, motorbikes etc. are depicted by different sized rectangles which move smoothly along the road, to the background sound of strained engines and horns.

This is not a bad arcade/strategy game with a slightly different concept. It should keep you entertained during those late nights. **Sandra Grandison**

Rating: 8/10
Price: £7.95 **Publisher:** Quicksilva (0703) 20169.

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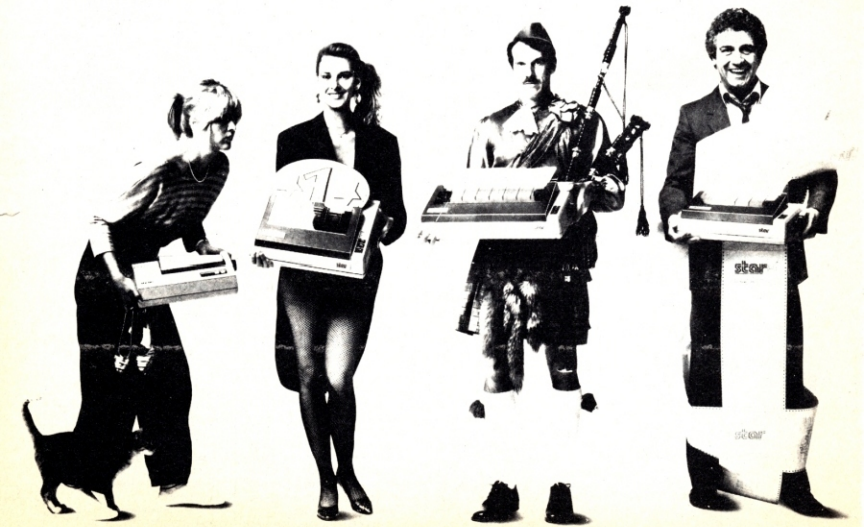
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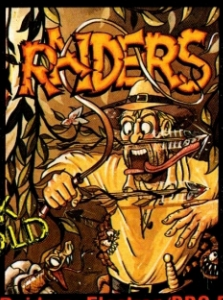
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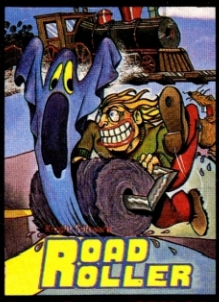
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Sale/Swap spinning outfit, 2 rods, 1 reel + lures, etc. All immaculate. For Atari hardware/software/810 D.D. or £150 ono. Tel: Rotherham 876306.

Atari 400/800 software for sale: Gorf cartridge, £10; Canyon Climber cassette, £5; Ghost Hunter cassette, £5. All originals with instructions. Tel: 01-341 0464 evenings.

Atari 810 + 48K with recorder, also disc DOS 3, interface 850, Atari writer/ W.P. touch tablet with ROM, pole position ROM other ROMs and cassettes, Offers. Tel: 01-677 9709.

Atari 600XL 64K + cassette recorder and joystick, still guaranteed. Over 25 games including Zaxxon, Solo-flight, Donkey Kong. Want £300, worth £550 + books. Tel: Corby 204963.

Atari 400 and cassette recorder 1010, books, Quickshot I + II and software, including Pac-Man, Star Raiders, QIX, Defender, Zaxxon, all boxed as new. Cost £450 new, only £250 (or less). Tel: 01-549 1054.

Atari 400 48K with full stroke keyboard, Basic and manuals, 410 tape recorder and £80 software. £100 ono. Tel: after 6pm 01-303 0527.

Atari VGS Pacman, Space Invaders, Superman; Star Raiders, Demon Attack, Haunted House, Soccer, and more. £150. Or swap for CBM 64. Tel: Yapton 553069 after 4pm.

Centronics interface for any of the Atari computers. Works with any Epson or compatible printer. All cables supplied £50. Tel: Worthing 45200.

Atari 800 48K and 1050 disk drive and Galaxians, Pole Position, Qix, Jumbo Jet Pilot, Submarine Commander, £350. will split software. Tel: Farningham 863428.

Atari 400 48K for spares or repair £25. Also various software from £2.50. Tel: 0429 222689.

Commodore

Vic 20 o/level software (IVAN BERG), Maths 2, Chemistry, Physics English, £5 each. Programmers Ref Guide £5. Wanted same for CBM 64. Tel: 01-668 8329 after 5pm.

Vic 20, cassette, super expander, 16K, monitor cartridge, light pen, some software and books. £110. Tel: 0799 24244 evenings.

Vic 20 good condition 3.5K memory + 12 games and tape recorder + joystick. Worth £179.87. Will accept £95 or will swap for any 48K Spectrum. Tel: Wellfield 836911.

Commodore 64, disc drive, cassette with 24 volumes: How To Compute plus over £150 software including Sub/ Logic II, £500. Tel: 0202 897952.

CBM 64 Software for sale. Simons basic, £30; The Hobbit, £750; Grandmaster Chess, £7.50; Home Office, £7.50 + books, etc. £45 the lot. Tel: 04012 4576 after 6pm.

Vic 20, 16K RAM, cassette unit, games software, joystick + lots of magazines and books. Will sell for £140 ono. Tel: 01-795 8578.

CBM 64 Software to swap or sell mostly American. Titles include: Blue Max, Zaxxon, International Soccer, Zeppelin, etc. Tel: 0527 27771.

Atari Logo II, Font Kit, III, + suspended for CBM64 with 1541 disk drive, £40 the lot. Tel: 0222 489236 after 6.30pm. Also Railboss £10 disk.

Commodore Pet 3016. New ROM, large keyboard, 16K, cassette, built in screen, very good condition, £250 including games: Invaders, Breakout, etc. Tel: Wolverhampton 757584.

CBM 64 + cassette recorder + Quickshot II and Atari joysticks, paddles + £400 of software + dust cover worth £700, will sell £285 ono. Tel: 01-883 2381 after 5pm.

CBM 64 + C2N cassette unit, BC Basic cartridge, software, Cost £380 new, 6 months old, used 4 times. Asking £300. Tel: 01-572 1869, Mon-Fri, 9am-8pm.

CBM 64 'O' Level History, Mathematics. £12 for the two. I am also looking for software to buy or swap, disk or tape. Tel: 051-423 5493 6pm.

CBM 64 C2N cassette, two joysticks, over £150 software, many magazines and books. Still in boxes. Bargain at £200. Call Tony 01-435 9148 (after 8), or 01-286 9532 (day).

Vic 20 complete starter pack, cassette, joystick, 8K expansion over £60 worth of software boxed as new. Will accept £70. Tel: Mike, Dagenham 897736.

Commodore 64 software. Solo Flight, £8; Snooker, £4; Flight 737, £3; 3-D Time Trek, £3; Music composer cartridge, £5. Books. Tel: Ruislip 35588.

CBM 64 printer. Seikosha GP 100-VC, £135 ono. Tel: 061-330 8514.

Commodore 64 £140. 1541 disc drive, £140; MPS 801 printer, £140; CNC, £25; Easyscript, £50; BC Basic cartridge, £40; 1 pair joysticks, £10. Tel: 01-594 1802.

Vic20. cassette unit, joystick, games, books, motherboard, cartridges including 16K RAM, super expander, VICMON, worth £320, sell for £160. Tel: 0332 553144.

CBM 64 + datasette, joystick, intro to Basic 1. Some games still. Boxed hardly used £175. Tel: 0342 713693 evenings.

CBM64/Spectrum software includes Giants Revenge and Poze Position. Write to: Steve, 377, Winchester Road, Bassett, Southampton, Hants 5017 DJ. Your list for mine. SAE appreciated.

Vic 20 16K switchable memory expansion, C2N cassette recorder, educational software worth £50. Manuals, guaranteed August 1986, many games. Only £240. Tel: between 4-6pm 021 551 6769.

Lynx

Lynx 48K for sale still in box, unused, all leads, etc. Bargain £99. Write to: Ian Paton, 39 Yates Street, Liverpool L8 6RD.

Lynx 48K C.W. manuals, leads, original packing, software, two user magazines and compatible cassette deck, £140. Tel: 01-422 3207 evenings ask for Daryl.

Lynx 48K computer, boxed with leads, magazines and introductory cassette. A bargain all for only £55. Tel: Billy, Stepney 01-790 7777.

Sharp

Sharp MZ80K 48K RAM printer, interface, 100 games, word processor, assembler, extends Basic, Forth, Fortran, database and service manuals, circuit diagrams. Must sell, £300 ono. Tel: Rickmansworth 774257.

MZ 80K 48K integral screen and cassette, lots of software including chess, database. Delivery possible in manufacturers box, £195. Tel: Redditch 60033 after 6pm.

Sharp MZ711 as new integral recorder and plotter printer, £300. Tel: 01-679 1422 office hours.

£100 plus best Spectrum outfit for Sharp MZ711 mint condition, plus S/W for my daughter. Write to: Mr Elvin, 214, Horninglow Road, Shefield 5.

Oric

Oric 1 48K, Oric printer, all leads, Oric Forth, Mushroom Mania, Harrier Attack, Raz Splat, Hunchback, plus others, plus books. £140. Tel: (0702) 612283.

Oric 1 plus b&w tv and cassette recorder. All in good condition. Also nine games including Xenon, Scuba Dive etc. Will accept £200. Tel: 0455 30509 after 7pm ask for Darren.

Oric Atmos, boxed, excellent condition, 8 month, guarantee remaining + books + £50 software. Will sell £160. Tel: 035 521 42564.

Oric Atmos books, some software boxed. £120.00 ono. Tel: 0787 75586.

Oric 148K plus cassette recorder and books. Also £75 software including Forth, Hobbit dis/assembler and joystick only £135 ono. Tel: Reading 667966 after 6pm.

Oric Atmos 48K still seven months guarantee + software 26 colour tv + tape recorder £110 ono. Tel: 0793 642886. Ask for William eves.

Oric 48K brand new still in box. One year guarantee £70. Games, four books, many magazines, £110 ono. Post free. Tel: 021-551 7874, after 5pm.

Oric 1 48K, cassette recorder, monitor and £40 worth of tapes and books fitted in console unit. All for £150. Tel: Walton-on-Thames 226424.

Oric Atmos 48K including cassette recorder and £90 worth of software plus 2 books. All for £240 ono. Tel: Dartford 28671 after 4pm except weekends.

Oric 1 48K £65 software, books, magazines, leads, etc. £100 ono. Also Oric printer with extra paper and pens £90 ono. Tel: Stevenage 350013.

Oric and Atari software tapes. Many titles, all mint condition, all originals, all at least 50% off recommended prices. Tel: Veronica on 0884 252854.

Wanted Oric 1 5.25in disc drive and D.O.S. Any help of information welcome. Tel: 0253 49493 evenings.

Oric Atmos 48K with lots of software, including the Hobbit, and a cassette recorder. Only £125. Tel: Woking 24631.

Sinclair

48K Spectrum software worth over £245; Kempston interface with joystick, blank tapes, under guarantee. Worth £400, sell £200. Tel: 01-808 5575 any time.

QL for sale £380 ono. Reason for selling, company transfer to USA, otherwise would not sell. Fantastic computer! Tel: 0672 810858.

48K Spectrum tape recorder software, Hobbit, Manic Miner, etc. ZX Interface 2, Quikshot 2, joystick, light pen, books, magazines £100's worth of software. Going for £250. Tel: 0547 528 395. Ask for Tony.

Spectrum software unwanted gifts, unused. Over £90 worth including Hobbit, Chequered Flag, Jetman and educational. Only £30, may split. Tel: 06286 62843 before 9pm.

48K Spectrum, interface one, microdrive, nine cartridges, Alphacom printer, Kempston joystick interface, sound amplifier, tape recorder, software, £295 ono. Tel: Mr Kwong 0823 76615.

QL delivered 1/7/84 sadly must go. £380 ono, also parallel interface, £40. Genuine reason for sale. Perfect condition. Tel: Tony 01-570 7374 after 7pm.

For sale Lunar Jetman original, £3.50; Avenger original, £2.50; also many magazines and Spectrum listings YC, PCW, £2 each. Offers welcome. Tel: 0532 671387 evenings.

QL Sinclair unwanted gift, latest model. Sensible offers. Tel: Ross-on-Wye 62987.

Spectrum 48K ZX printer + 5 rolls paper, joystick interface 2. Ferguson software worth £700, under guarantee, sell for just £200 ono. Tel: 0254 55364.

Sinclair QL for sale. No donggles. Tel: 01-802 7798.

48K Spectrum, ZX printer, tape recorder and software worth over, £300. total value, £495, sell for £150. Tel: Miguel 01-354 2879 after 5pm.

48K ZX Spectrum + joystick and interface + over £200 of software, guarantee + tape recorder, £180 ono. Swap for BBC B or Electron. Cash adjustment maybe. Tel: 01-995 1874 after 3.30pm.

Digital Circuit Design Program (48K Spectrum), £8. Lords of Time, £5. Adventure Quest £5 Write to D. Hawkins, 107 Butts Hill Road, Woodley, Reading, Berkshire. Tel: 0734 698094.

Spectrum 48K brand new with software, unused and unwanted present with one year guarantee, £120 includes delivery. Tel: 01-636 9636.

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Sinclair Interface 1 + Microdrive + two cartridges £75. alphacom 32 printer + paper £55. Currah speech £20. Kempston joystick + interface £15. Cambridge intelligent joystick £20. Tel: 01-571 3961 evenings.

48K Spectrum + sound amplifier, lots of software, books + mags £150. Games designer £5 and Hisoft Devpac 3 £5. Tel: 01-571 3961 evenings.

32K RAM pack for ZX Spectrum for sale. Offers around £28. Tel: 01-673 1370.

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ZX81 complete with 16K printer learning lab, manuals, software and one box unused printer rolls, all leads. £90 ono. Tel: 01-487 5689 ask for Ref SRC.

QL for sale. Unused 2nd version complete with printer cable £400 ono. Tel: 01-487 5689 ask for Ref SRC.

Wanted Spectrum joystick, preferably Quickshot with DKTronics interface. Will exchange for Computer-Battleships and Mamod Steam-Engine. Ring Richard Guisborough 36803. After 6pm.

Spectrum software to swap or sell. Also Electronic Mastermind as new £6. Sinclair Enterprise programable calculator with manuals £15. Tel: Mike 061 775 6034 evenings only.

Swap my Spectrum 48K + software + cassette + mags/ worth £250, for CBM64 or sell for £180. Will collect. Tel: 01-801 8938.

Spectrum software: Horace games, Nightflite, Transylvanian Tower, Jumping Jack, Schizoids, Ah Diddums, Centipede, Zzoom, Pssst, Kong, Hunchback, and Penetrator. All originals. £35 the lot. Tel: 0904 849933.

Spectrum software to swop/sell. Also, lots Scalextric car racing stuff to sell, or swop for Spectrum software/accessories. Tel: Anthony on Oxford 58395.

ZX81 16K, 8 programs, magazines, books. Ideal Xmas present. Tel: (0388) 745283 £40 ono.

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Spectrum 48K, interface 1, microdrive, UTX5000 modem, joystick and interface, sound amplifier + various software and cartridges. £275 ono. Tel: 01-590 5004 evenings.

ZX81. Twelve cassettes, original commercial programs + six books. Cost £70 + Lot, £20. For details Tel: Russell 01-690 2983.

Wanted for ZX81, tape load TL by computer will pay cash. Tel: Deal 867190.

48K Spectrum, interface 1, microdrive, 6 cartridges, Kempston interface, Quickshot II joystick, ZX printer/ paper lots of software, some on microdrive, £270. Tel: Plymouth 262838.

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TRS-80 colour computer. Model 1, level II with 16K. Unwanted present, in mint condition, comes with manuals, books and magazines — accept, £110 ono. Ask for Rob Tel: 051-531 0495.

TRS-80 Model 4, 64K, includes monitor, 2 disk drives, TRS-DOS, £6, boxed with manuals and mod 4, Planner-Calc, £775. Tel: Hatfield 68419 evenings or weekends.

Wanted TRS 80 Mod I. Expansion interface with 32K memory upgrade. Also wanted assembler, disassembler, monitor & business software on cassette. Tel: Bristol 0272 562763.

Tandy model 100 32K + cassette recorder, leads, mains unit, finance programme. Sells new at £750. Will sell for £500. Tel: Windsor 51963.

Tandy CGP115 printer plotter. Centronics and RS232 interfaces. Such many micros. Programs for BBC, including screen dump. Extra pens and paper. £950. Tel: Mottram 64064.

Software for TRS 80 colour computer urgently required. Roger. Orpington 30281.

Printer Tandy CGP115 four-colours RS232C and Centronics interfaces. Prints text at up to 80 characters per line + graphics £95. Prism acoustic modem with software £45 ono. Tel: Peter on Ruislip 72815.

Peripherals

Dragon 32 joystick, printer, and cassette leads, Chess cartridge, Arcade and adventure games. Book, mags etc. £120 ono. Tel: Sunbury (09327) 85511 extn 3169, office hours.

Seikosha GP 80A printer. Good condition. Cable, listing paper, £70. Tel: 090-483 328.

Epson FX-80 printer, parallel and series interface. Unwrapped, unused. Buyer gets free gift, £395 ono. Tel: 01-435 6421.

For sale Epson FX80 including 32K buffer, two spare ribbons, paper and BBC cable. Worth over £510, selling for £450 ono. Tel: Lawrence 01-229 0853.

Kempston competition-pro joystick suitable for most computers, as new. Still boxed, £8. Tel: (Tony) 041-636 1239.

Lucas LX80 quality dot matrix printer. RS232C and parallel interfaces. Suit most computers. Bargain at only £170. Tel: Mark on 04012 4576, after 6pm.

Juki 6100 daisywheel printer vgc, six months old, makers guarantee, £299. Kempston Centronics interface, £30. Password Two, £5. Full documentation. Tel: 01-767 4470.

Kempston Centronics interface S with three accounts programs. Little used microdrive compatable, £40. Tel: Bourne End 22437.

Sanyo MB555. Two 160K d/drives, Wordstar, Calcstar, Infostar, Report Star, £950 ono or exch. for Wren TRS new model 80 HP. Tel: 021-350 1193.

Epson RS80-F/T printer. Hardly used. Still in box with leads and manual. As new, £250. Tel: Paul on (0602) 231265.

Sanyo colour monitor 3125N, BBC lead £150. Merlin Scribe wordprocessor, complete, boxed £35. Ultracall spreadsheet boxed. As new £50. Tel: 659 1303 after 7pm.

9" Aperet monitor for sale. Almost new, includes carry case in nylon — very sturdy. Tel: 0865 57671 evenings to view.

Others

Wanted: This buyer wishes a large collection of recent Technical Electronics or Computing magazines, preferably weekly home study courses. Tel: 041-883 9264.

MS DOS/PC DOS owners D base 2 version 2.4 for sale. Costs £470 new. Will accept £250 ono. Runs on Sanyo MBC. Tel: Alan on 01-986 6752 9pm.

Sorcerer 64K with synthesis and music S100 cards, dual QUAD density drives. Complete with CP/M2.2, d Base II, Spellbinder and SuperCalc, £950 ono. Tel: 070-487 2137.

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Six good games. Sale or swap, £4 each. Note: will swap any 3 for Aardvark's 'Frak!' Tel: (0685) 6357, ask for Joe.

Donations of hardware and software welcome for computer club. Write to: Mr Chris Haine, 4 Cord Lane, Easenhall, Rugby, Warwickshire CV23 OH2.

Hornby model railway for sale. 'OO' scale. Much stock (6' × 4'), double loop and carriages, £70 ono. Write to: Mr C. Haine, 4 Cord Lane, Easenhall, Rugby CV23 OH2.

Swap Electrex video game with six cartridges for any home computer (32K or above). Tel: Mansfield (0623) 643361 and ask for Andy.

Telescope 13 to 40× Zoom. Computerised flash gun, electronic darkroom exposure meter, exchange for BBC recorder or? Mr R. Mackay. Brochrobie, Brora, Sutherland, Scotland KW9 6NE.

Wanted your computer magazine December, 1981. Anyone who can help, please Tel: Andy on Coventry 618427 (good condition please).

Personal Computer News First 64 editions in mint condition. Highest offer accepted. Tel: 01-907 8409.

Colecovision game cartridges. Popeye £17, Qbert £17, intellivision cartridges-Super cobra £17, Tutenkunam £17, Tropical Trouble £12, plus 13 others from £6 each. Details: 01-764 4075.

Multitech MPF-1 Z-80 machine code development system 4K RAM. With Basic, all manuals, P.S.U., etc. Must sell, £50 ono. Tel: 0703 694856.

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Dragon 64 six months old. Various books, magazines and software £130 two Dragon disc drives with controller £260 or £370 inclusive. Tel: (0245) 266289.

Dragon 32, with joystick HI-RES, DASM, dissassembler, 14 games, ED-QUIZ, Computavoice, mags, five books. Cost £330 new, sell for £125 ono. Will separate. Tel: 01-997 2548.

Dragon 64, cassette recorder, joysticks, Dragon Forth, plus books, mags, and tapes. £180 for quick sale. Harrison, 54 Claremount Ave., Hull. Tel: 0482 45130.

Intellivision complete with cartridges. Unwanted gift, ideal Xmas present. Gives away price. £85. Tel: 0253 701118 after 7pm.

All PCNs less 13 x 14, Practical Electronics and Electkor complete bound sets. Some Apple II programs and cards. Tel: 01-958 7482 evenings.

Colour Genie pen pal's wanted to swap program's etc. Everything helps. (32K). Have German machine code programs. Other Basic stuff to. Write: Fakkers, A. T. Groot Rijshoofd 14, Pernis, Netherlands.

CIRCUITBOARDS for sale/swop for something (computer or role-playing game accessories) complete kit with two boards, will split. Also, got lighten (£12.50 ono), tons computer magazines, tons Scalextrx. Tel: (0865) 58395.

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QUIT

Ho, ho, ho... she says

A sackful of entries to the Laughline from issue 77 had us chortling happily, and some of the less smutty ones were good for a laugh as well.

'Santa's bit on the side', 'two Christmas crackers' — these are just two of the completely sexist and therefore banned entries. There was also one we didn't understand, so we won't print that just in case . . .

The winner of the £20 prize this time is Lynne Starkey of Hemel Hempstead: 'You don't believe in Father Christmas? Just close your eyes and make a wish!'



Lingo gap

The selling phrase of the new software package Lingo is: 'It makes fun out of the English language'. In our book (Chambers Twentieth Century Dictionary) 'to make fun of' means 'to ridicule'. Granted, this in turn is defined as 'to expose to merriment', but there are also the more common meanings of 'to deride or mock'. Is the wording deliberately ambiguous? Or simply an oversight? Or does the publisher of a language game speak a different language?

SYNTAX ERROR

Production gremlins hit our Spectrum adventure 'The High Mountains', published in issue 79. The layout artist in question has had his hands chopped off, these being the parts of his body that he's least likely to miss in his work.

In Listing 1, the black blob in line 800 should be left out. Listing 2 should have a line 3820 similar to 3830 except that i should be used instead of j:

```
3820 IF I(Z)<>0 THEN PRINT TAB
13; b$((i(z)))
```

Line 7920 should have an extra 1 on the end:

```
7920 DATA "THE FOREST IS THIN
HERE.",1,0,1,1
```

Line 8160, lines 8500-8520 and lines 9270-9290 have been duplicated. Obviously you should only type them in once, but you should use the second version of 8520, not the first.

Sound of Music fans will be pleased to type in this small improvement to the Atmos Bach program in issue 80:

```
4660 DATA 16,48,55,54,18,48,55.
57,19,46, 58,60,15,46,62,158
```

The problem of typing in the data statements can also be eased by copying and renumbering identical lines. These are 2120-2980, which should be copied as 3020-3880; 2220-2280 (4020-4080); 2040 (4460); 2620-2740 (4820-4940) and 2060-2280 (5160-5380).

In last week's Microwaves, Spectrum owners may have had a little trouble when trying to experiment with the SCREEN$(y,x) function applied to UDGs ('Stringing along with a Spectrum screen') . . . not terribly surprising since the listing was in fact a Basic program revealer for the BBC (all will be revealed in a later issue). Our anonymous author has written in with his name, Nigel Mellor, and also the correct program, which is as follows:

```
9000 REM ** SCREEN$ FOR UDG'S
**
9010 POKE 23606,80 : POKE 23607,253
9020 LET C=CODE SCREEN$ (y,x)
+ 79
9030 POKE 23606,0 : POKE 23607,60
9040 LET C$=CHR$ C
9050 RETURN
```

NEXT WEEK

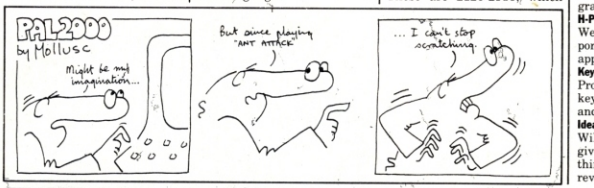
Join the Elite
Acornsoft strikes back with Elite, the game of the moment.

Output queue
We have graphics for the BBC, a neat lister for the Spectum, utilities for the Commodore 64, and graphics for Atari users.

H-P takeaway
We put Hewlett-Packard's 110 portable with its ROM-based applications through its paces.

Key to print
Pro-Tests of an extension musical keyboard for the Commodore 64 and Vic's RAM expansion.

Ideas machine
Will Ideaware's ideas processor give your IBM PC something to think about? Find out in this review.



PCN DATELINES

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London Business Equipment Exhbn — LBES	October 23-26	Earl's Court, London	BED Exhibitions, 01-647 1001
Computer Exhbn — Computers	October 24-27	Johannesburg, S. Africa	Specialised Exhbns, 01-486 1951
Electron & BBC Micro User Show	October 25-28	Alexandra Palace, London	Database Publications, 061-456 8383
Home Tech '84	October 26-29	Exhbn Complex, Bristol	Nationwide Exhibitions, 0272-650465/15
Computer Security Conf & Exhbn	October 29-30	Conf Centre, Nottingham	Elsevier Int Bulletins, 0865-512242
COMDEX/Europe	Oct 29-Nov 1	Amsterdam, Holland	Interface Group Inc., Amsteldijk 166, 1079 LH, Amsterdam, Holland
SE Asian Personal Computer Exhbn & Conf — PerCompAsia	Oct 29 — Nov 2	Singapore	Overseas Exhbns Services, 01-486 1951
Computers in Action	Oct 30-Nov 1	Anderson Centre, Glasgow	Trade Exhibitions, 0764-4204
Personal Computer Fair	Oct 30-Nov 1	Town Hall, Bournemouth	Mike Schofield Promotions, 0202-36899
Computer Conf & Exhbn — Mini/Micro West	Oct 30-Nov 2	Anaheim, USA	Electronic Conventions Inc, 8110 Airport Blvd, Los Angeles, CA 90045

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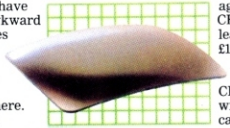
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SPECTRUM

DRAW

Superdraw is a graphics utility that will run on the 16K or 48K Spectrum. It allows you to create pictures of the sort used in commercial software, and although it's written in Basic this isn't actually a disadvantage, as a graphics program that runs too fast is difficult to use.

The program has a number of handy functions, including circle and curve drawing. You can also use it to draw squares and triangles, and the program is short enough to allow you plenty of room to develop it further.

In the case of the functions you'll be asked to give details of the shape to be drawn. The paper colour is set at the beginning of the program, but you can change the ink colour whenever you want. The BEEP command is used as a delay to control the speed of drawing, so if you find it's too fast just increase the length of the BEEP.

```
1   5 INPUT "paper ?",p: PAPER p: INPUT "b
order ?",b: BORDER b: INK 9
   7 PRINT  AT 1Ø,Ø; BRIGHT 1;"Do you want
 instructions ?       "
   8 IF  INKEY$ ="y" THEN  GO TO 11
   9 IF  INKEY$ ="n" THEN  GO TO 9Ø
  1Ø GO TO 8
  11 PRINT  BRIGHT 1;''"SUPER DRAW is a pr
ogram to aid  the usage of hi-resolution
    graphics on the ZX Spectrum"''"Press a
ny key to continue": PAUSE Ø
  12 PAUSE Ø: CLS : PRINT  BRIGHT 1'"Here
the facilities              available in SU
PER DRAW ."''"5,6,7 and 8 for normal direc
tion"''"E,R,D and F for the points      in
between these"''"1 to return to screen cen
tre"''"Q to change the plot position"''"W
is to draw curves ";
  13 PRINT  BRIGHT 1''"C to draw a circle"
''"P to make a copy of the present co-ordi
nates for later use"''"O to print on scree
```

The controls are as follows:

Q – Change plot position
W – Draw curves
C – Draw circles
P – Copy present coordinates for later use
O – Print on the screen
I – Change ink colour
A – Save picture to tape
L – Draw a line
V – Clear the screen
S – Draw a square
T – Draw a triangle
Z – Stop

```
n": PAUSE Ø: CLS : PRINT  BRIGHT 1;"I to c
hange ink colour"''"G to save the picture
on tape  under a given name"''"L to draw
a line"''"V to clear screen"''"your presen
t co-ordinates appear at the bottom of the
 screen"
  15 PRINT  BRIGHT 1;''"S is to draw a squa
re when you  input half the length of a si
de."''"O is to input OVER "''"T is to draw
 a triangle"''"Z is to stop.": PAUSE Ø: CL
S
  9Ø CLS
 1ØØ LET x=127
 11Ø LET y=87
 12Ø PLOT x,y
 125 LET a$= INKEY$
 13Ø IF a$="5" THEN  LET x=x-1: BEEP .ØØ5,
Ø: GO TO 17Ø
 131 IF a$="6" THEN  LET y=y-1: BEEP .ØØ5,
13: GO TO 17Ø
 132 IF a$="7" THEN  LET y=y+1: BEEP .ØØ5,
26: GO TO 17Ø
 133 IF a$="8" THEN  LET x=x+1: BEEP .ØØ5,
39: GO TO 17Ø
 134 IF a$="e" THEN  LET x=x-1: LET y=y+1:
 BEEP .ØØ5,-1Ø: GO TO 17Ø
 135 IF a$="d" THEN  LET x=x-1: LET y=y-1:
 BEEP .ØØ5,2: GO TO 17Ø
 136 IF a$="r" THEN  LET x=x+1: LET y=y+1:
 BEEP .ØØ5,15: GO TO 17Ø
 137 IF a$="f" THEN  LET x=x+1: LET y=y-1:
 BEEP .ØØ5,25: GO TO 17Ø
 138 IF a$="l" THEN  GO SUB 1ØØØ: INPUT "p
lot x ? ";x: INPUT "ploty ? ";y: INPUT "dr
aw x ?";x1: INPUT "draw y ? ";y1: PLOT x,y
: DRAW x1-x,y1-y: GO SUB 1ØØ1
 139 IF a$="i" THEN  INPUT " ink ? ";i: IN
K i
 14Ø IF a$="w" THEN  GO SUB 1ØØØ: INPUT "x
-axis ? ";x2: INPUT "y-axis ? ";y2: INPUT
"size of curve";z: LET z=z/18Ø* PI : PLOT
x,y: DRAW x2,y2,z: GO SUB 1ØØ1
 141 IF a$="o" THEN  INPUT "line ? ";l,"co
lumn ? ";c: INPUT "words ?",w$: PRINT  AT
l,c;w$
 142 IF a$="c" THEN  INPUT "radius",z: CIR
CLE x,y,z
 144 IF a$="s" THEN  INPUT "size of half s
quare ? ";a: GO SUB 2ØØØ
```

```
 146 IF a$="q" THEN  INPUT "x-axis",n: INP
UT "y-axis",m: LET x=n: LET y=m: GO TO 170
 148 IF a$="p" THEN  PRINT  AT 0,0; OVER 0
;x;"    "; AT 0,16;y;"    "
 149 IF a$="1" THEN  LET x=127: LET y=87:
GO TO 170
 150 IF a$="v" THEN  CLS
 151 IF a$="0" THEN  INPUT " over ? ";o: O
VER o
 152 IF  IN 31=2 THEN  LET x=x-1: BEEP .00
5,0: GO TO 170
 153 IF  IN 31=4 THEN  LET y=y-1: BEEP .00
5,13: GO TO 170
 154 IF  IN 31=8 THEN  LET y=y+1: BEEP .00
5,26: GO TO 170
 155 IF  IN 31=1 THEN  LET x=x+1: BEEP .00
5,39: GO TO 170
 156 IF  IN 31=10 THEN  LET x=x-1: LET y=y
+1: BEEP .005,-10: GO TO 170
 157 IF  IN 31=6 THEN  LET x=x-1: LET y=y-
1: BEEP .005,2: GO TO 170
 158 IF  IN 31=9 THEN  LET x=x+1: LET y=y+
1: BEEP .005,15: GO TO 170
 159 IF  IN 31=5 THEN  LET x=x+1: LET y=y-
1: BEEP .005,25: GO TO 170
 167 IF a$="g" THEN  PRINT  AT 21,0; OVER
0;"    ","    ": INPUT "name ? ";s$: SAVE
s$ SCREEN$
 168 IF a$="t" THEN  GO SUB 2500
 169 IF a$="z" THEN  STOP
 170 IF x >= 0 AND y >= 0 AND x <= 255 AND
 y <= 175 THEN  PLOT x,y
 180 PRINT  AT 21,0; OVER 0;x;"  "; AT 21,
16;y;"  ": GO TO 125
 200 STOP
1000 INPUT "space between lines ? ";u: GO
SUB 1001: RETURN
1001 FOR n=0 TO 255 STEP u: PLOT n,0: DRAW
  OVER 1;0,175: NEXT n: FOR n=0 TO 175 STE
P u: PLOT 0,n: DRAW  OVER 1;255,0: NEXT n:
 RETURN
2000 PLOT x+a,y-a: DRAW 0,2*a: DRAW -2*a,0
: PLOT x+a,y+a: DRAW -2*a,0: DRAW 0,2*a: R
ETURN
2500 LET o=0: OVER o: INPUT "size of side
";z;: PLOT x,y-z: DRAW z/2,0: DRAW -z/2,z:
 PLOT x,y-z: DRAW -z/2,0: DRAW z/2,z: OVER
 1: RETURN
9999 SAVE "SUPER DRAW" LINE 1
```

SPECTRUM

COLCHA

The following short machine code routine can be used to change the attributes of the Spectrum's screen without clearing the screen. The code is completely relocatable, and when you run the program it will ask you for the start address before it POKEs the data in.

As it's quite short it can be stored above RAMtop and called up for use in your own programs. Normally to implement a change in screen attributes you have to use the form:

INK 7: PAPER 0: CLS

In order to use this routine you use the same sort of syntax, but in the form:

INK 7: PAPER 0: RANDOMIZE USR start address

The routine will work for any command used for changing the attributes, including BRIGHT and FLASH.

```
  10 INPUT "Start address";a
  20 FOR n=a TO a+15
  30 READ q
  40 POKE n,q
  50 NEXT n
  60 DATA 58,141,92,33,0,88,17,1,88,1,0,3,
119,237,176,201
  70 PRINT "Now save the code"
  80 SAVE "colours" CODE a,16
  85 PRINT "Rewind tape and press a key to
  verify"
  90 PAUSE 0
 100 VERIFY "colours" CODE
 110 PRINT "verified OK"
 120 PRINT "Before loading type CLEAR ";a-
1
```

COMMODORE

SOLO

Take the controls of your jetship and head deep into the depths of the world for a record-breaking speed-run. How far can you get in one minute or before the inevitable happens and you crash?

Solo Mission uses several outstanding techniques including a machine code, split-screen scroll, and interrupt driven sprite control. It was written for PCN by Tony Crowther of Gremlin Graphics.

The data statements set up the sprites, user-defined graphics and machine code routines. The position of the sprite is handled by the machine code, as is the scroll. The Basic is largely concerned with initial screen set-up, collision detection and the end-of-game sequence. You can add further features to the game within the main loop from lines 1006 to 2000. Adding to the Basic won't affect the machine code since it is self-locating at the end of Basic.

Controls are LOGO and SHIFT for fast and slow, and ; and / for up and down. In some places because of their aerial mines, the tunnel is impassable – tough luck.

```
0 PRINTCHR$(8)
100 DATA0,0,0,0,0,0,0,0
110 DATA0,0,0,0,0,0,0,0
120 DATA0,0,0,0,0,0,0,0
130 DATA10,15,0,58,191,192,250,191
140 DATA232,250,170,170,58,170,170,2
150 DATA170,170,0,170,168,0,0,0
160 DATA0,0,0,0,0,0,0,0
170 DATA0,0,0,0,0,0,0,0
180 DATA255,255,255,255,255,255,255,255
190 DATA170,85,85,85,0,0,0,0
200 DATA0,0,0,1,23,2,169,1
210 DATA141,25,208,141,18,208,141,26
220 DATA208,169,0,141,14,220,169,16
230 DATA141,17,208,120,169,56,141,20
240 DATA3,169,48,141,21,3,88,96
250 DATA169,1,141,25,208,238,21,48
260 DATA173,21,48,201,1,208,109,169
270 DATA21,141,24,208,169,86,141,18
280 DATA208,169,0,141,22,208,76,98
290 DATA49,169,0,141,21,48,169,29
300 DATA141,24,208,169,0,141,18,208
310 DATA173,20,48,56,237,19,48,201
320 DATA16,176,10,24,105,8,141,20
330 DATA48,76,137,48,234,141,20,48
```

```
340 DATA76,49,234,0,0,0,0,0
350 DATA0,234,162,0,189,241,4,157
360 DATA240,4,232,224,240,208,245,162
370 DATA0,189,225,5,157,224,5,189
380 DATA209,6,157,208,6,232,224,240
390 DATA208,239,76,203,48,224,240,208
400 DATA245,76,129,234,201,2,208,161
410 DATA173,20,48,141,22,208,169,160
420 DATA141,18,208,169,29,141,24,208
430 DATA76,129,234,169,23,133,250,169
440 DATA5,133,251,162,0,160,0,169
450 DATA0,145,250,165,250,24,105,40
460 DATA133,250,165,251,105,0,133,251
470 DATA232,224,18,208,232,169,0,141
480 DATA132,48,169,23,133,250,169,5
490 DATA133,251,174,131,48,165,250,24
500 DATA105,40,133,250,165,251,105,0
510 DATA133,251,202,16,240,169,1,160
520 DATA0,145,250,162,0,165,250,24
530 DATA105,40,133,250,165,251,105,0
540 DATA133,251,169,38,160,0,145,250
550 DATA232,224,5,208,232,76,56,49
560 DATA0,0,0,0,0,0,0,0
570 DATA169,1,141,15,220,173,6,220
580 DATA201,30,176,13,173,131,48,201
590 DATA0,240,3,206,131,48,76,95
600 DATA49,201,200,144,249,173,131
610 DATA48,201,10,240,242,238,131,48
620 DATA76,129,234,165,197,201,50
630 DATA208,3,206,1,208,201,55,208,3
640 DATA238,1,208,238,6,220,238,6,220
650 DATA173,6,220,41,31,201,1,176
660 DATA36,133,172,169,5,133,171,169
670 DATA183,133,170,174,131,48,202
680 DATA240,14,165,170,24,105,40,133
690 DATA170,144,2,230,171,76,142,49
700 DATA169,53,160,0,145,170,76,129
710 DATA234,20,20,105,105,105,20,20,0
900 FORI=12224TO12719:READA:POKEI,A:
    TT=TT+A:NEXT
910 IFTT<>54591THENPRINT"␣DATA ERROR"
    :END
1000 A=12307:REM SPEED
1001 B=12308:REM POS/SCROLL
1002 C=12419:REM TUNNEL:YCO-OD
1003 D=53249:REM CAR YCO
1004 E=53248:REM CAR XCO
1005 SC=0:POKEE+21,0:GOTO6000
```

COMMODORE

```
1006 POKE53280,0:POKE53281,12:PRINT"■":
     POKE53281,0:TI$="000000"
1008 POKEA,5:POKEC,5:SYS12310:PRINT"
     ■■■■■■■■■■■■■■■HI SCORE "HI
1009 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■
     ■■■■TIME "RIGHT$(TI$,3)
1012 PRINT"■■■■■■■■■■"
1013 FORI=0TO39:POKE1224+I,38:POKE1984+I
     ,38:NEXT
1014 POKEA,0:POKE54276,0:POKE54277,31:
     POKE54273,2:POKE54276,129:POKE54296
     ,15
1020 FORI=0TO11:PRINT"■■■■&&&&&&&&&&&&"
     :NEXT
1022 POKEE,100:POKED,160:POKEE+21,1
1023 POKE2040,191:POKEE+28,1
1024 POKEE+37,1:POKEE+38,11:POKEE+39,14
1100 FORI=1TO10:S=53279:W=PEEK(S):NEXT
1300 T=PEEK(653)
1301 IFPEEK(S)THEN3000
1302 IFTI$>"000060"THEN3000
1303 POKE54276,0:POKE54277,21:POKE54273,
     PEEK(A):POKE54276,129
1499 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■
     ■■■■TIME "RIGHT$(TI$,3):POKE53286,1
1500 SC=SC+PEEK(A):PRINT"■■■■ SCORE";SC
1501 IFT=1THENIFPEEK(A)<6THENPOKEA,PEEK
     (A)+1
1502 IFT=2THENIFPEEK(A)>0THENPOKEA,PEEK
     (A)-1
2000 GOTO1300
3000 POKEA,0
4000 POKE53274,0:POKE788,49:POKE789,234
     :POKE56334,1
4001 PRINT"■":POKE53248+24,21
4002 POKE54296,15:POKE54276,0:POKE54277,
     31:POKE54273,140:POKE54276,129
4003 FORI=1TO500:NEXT:POKEE+21,0
5000 IFSC>HITHENHI=SC
6000 A$(1)="■SOLO MISSION":POKE53280,0:
     POKE53281,0:PRINT"■■"
6001 A$(3)="■FOR CBM 64":POKE53270,200:
     POKE53265,27
6003 A$(4)="■BY TONY CROWTHER:GREMLIN
     GRAPHICS
6004 A$(5)="■KEYS ■;■ & ■/■  UP & DOWN"
6005 A$(6)="■LOGO KEY & SHIFT   SLOW & FAST
6006 A$(7)="■HI SCORE   ="+STR$(HI)
6007 A$(8)="■YOUR SCORE ="+STR$(SC)
6008 A$(9)="■PRESS SPACE TO PLAY"
6009 A$(2)="■■■■■■■■■■■■■■■■■■■■"
6010 FORI=1TO9:FORJ=1TOLEN(A$(I))
6012 PRINTMID$(A$(I),J,1)"■";:FORK=1TO4:
     NEXT:NEXT:PRINT" ":NEXT
6013 GETA$:IFA$<>" "THEN6013
6014 SC=0:GOTO 1006
```

COMMODORE

PRINTAT

Among the many features missing from the Commodore 64 Basic is the Print At or Print @ command. This is a useful facility for screen formatting, but it also has uses in games for simple animation.

The machine code program here rectifies the omission in just 39 bytes. The routine sits above Basic memory at C000 (hex), 49152 (dec). By defining the variable At to the start address, you get the new command SYS AT,x,y,*string*. *String* can be a literal string such as "XYZ", or a defined variable such as A$, or MID$(A$...)

The routine makes use of calls to the Basic ROM to evaluate the x and y values, and to generate error messages if the values are out of range (x = 0 to 39, y = 0 to 24). The x,y position is set by the call to $FFF0, the Kernal PLOT routine.

In addition to the disassembled listing, we've included a Basic loader and demonstration program to show how fast and simple SYS AT is to use. You can relocate to avoid clashes with other machine code routines, simply by changing the values for the start address and AT in lines 1000 and 1010.

```
.,  C000 20 F1 B7 JSR $B7F1
.,  C003 86 57    STX $57
.,  C005 20 F1 B7 JSR $B7F1
.,  C008 86 58    STX $58
.,  C00A A5 57    LDA $57
.,  C00C C9 28    CMP £$28
.,  C00E B0 06    BCS $C016
.,  C010 A5 58    LDA $58
.,  C012 C9 19    CMP £$19
.,  C014 90 03    BCC $C019
.,  C016 4C 48 B2 JMP $B248
.,  C019 A6 58    LDX $58
.,  C01B A4 57    LDY $57
.,  C01D 18       CLC
.,  C01E 20 F0 FF JSR $FFF0
.,  C021 20 FD AE JSR $AEFD
.,  C024 4C A0 AA JMP $AAA0
.,  C027 00       BRK
```

```
10 PRINTCHR$(147):GOSUB1000
20 REM *****DEMO**********
30 FORX=2TO38STEP4
40 FORY=20TO1STEP-2
50 SYSAT,X,Y,"**"
60 NEXTY,X
70 FORX=38TO0STEP-1
80 SYSAT,X,12," ++ "
90 NEXT
99 END
1000 FORI=0TO38:READA:POKE49152+I,A:NEXT
1010 AT=49152:RETURN
1020 DATA32,241,183,134,87,32,241
1030 DATA183,134,88,165,87,201,40
1040 DATA176,6,165,88,201,25,144
1050 DATA3,76,72,178,166,88,164
1060 DATA87,24,32,240,255,32,253
1070 DATA174,76,160,170
```

B.B.C.

If you have ever wanted to obtain a screen dump of a picture from the screen of your BBC, without modifying the program that produces the picture, the following interrupt routine may be of assistance. Normally, the program should be used with cassette systems, but it can be used with disks by typing *TAPE after everything has been loaded.

The program comes in two sections, the first is the data for a screen dump routine, the second is the interrupt routine to run it with. After entering the program, run it and use the following addresses. The start address of the dump routine is &900, the end address is &ADB, and the execution address is &900. Once this has been done, simply follow the instructions given on the screen. Note that the printer needs to have its auto line feed on i.e. after *FX 6 0 two line feeds are produced for every carriage return.

```
 10REM//Paul F. Tolson, August 1984//
 20MODE7
 30 FOR T=&900 TO &ADB
 40 READ B$:?T=EVAL("&"+B$)
 50 NEXT
 60 DATA AD,50,3,85,8E,AD,51,3
 70 DATA 85,8F,A9,19,85,8D,A9,2
 80 DATA 20,EE,FF,A9,1B,20,A3,A
 90 DATA A9,38,20,A3,A,AE,55,3
100 DATA E0,7,D0,2E,20,91,A,20
110 DATA 91,A,A2,28,B1,8E,29,7F
120 DATA C9,20,B0,2,A9,20,20,A3
130 DATA A,E6,8E,D0,8,E6,8F,10
140 DATA 4,A9,7C,85,8F,CA,D0,E4
150 DATA 20,A1,A,C6,8D,D0,D5,4C
160 DATA 60,A,A9,28,E0,6,F0,5
170 DATA A,E0,3,D0,40,85,8C,20
180 DATA 91,A,20,6F,A,A9,80,85
190 DATA 8A,A0,7,B1,8E,25,8A,C9
200 DATA 1,66,89,88,10,F5,A5,89
210 DATA 20,A3,A,46,8A,D0,EA,A9
220 DATA 7,65,8E,85,8E,90,8,E6
230 DATA 8F,10,4,A5,7,85,8F,C6
240 DATA 8B,D0,D2,20,A1,A,C6,8D
250 DATA D0,C5,4C,60,A,A9,20,85
```

B.B.C.

```
260 DATA 8D,A9,1B,20,A3,A,A9.41
270 DATA 20,A3,A,A9,8,20,A3.A
280 DATA A9,28,E0,4,F0,A7,E0.5
290 DATA F0,5,A,E0,0,F0,F5.85
300 DATA 8C,E0,1,D0,58,20,91.A
310 DATA 20,6F,A,A9,88,85,8A.A0
320 DATA 7,B1,8E,25,8A,C9,10.66
330 DATA 89,29,F,C9,1,66,88.88
340 DATA B1,8E,25,8A,C9,10.66,88
350 DATA 29,F,C9,1,66,89,88.10
360 DATA E0,A5,89,20,A3,A,A5.88
370 DATA 20,A3,A,46,8A,90,D0.A9
380 DATA 7,65,8E,85,8E,90,8.E6
390 DATA 8F,10,4,A5,7,85,8F.C6
400 DATA 8B,D0,B8,20,A1,A,C6.8D
410 DATA D0,AB,4C,60,A,20,91.A
420 DATA 20,6F,A,A9,80,85,8A.A0
430 DATA 7,B1,8E,25,8A,C9,1.66
440 DATA 89,88,10,F5,A5,89.20,A3
450 DATA A,66,8A,B0,8,66,8A.90
460 DATA E6,A9,40,D0,E0,A5.8E,69
470 DATA 7,85,8E,90,8,E6,8F.10
480 DATA 4,A5,7,85,8F,C6,8B.D0
490 DATA CA,20,A1,A,C6,8D.D0.BD
500 DATA A9,1B,20,A3,A,A9,32.20
510 DATA A3,A,A9,3,4C,EE,FF.A2
520 DATA 1,A0,4B,A5,8C,85,8B.C9
530 DATA 50,A9,40,90,3,E8,C8.A
540 DATA 48,A9,1B,20,A3,A,98.20
550 DATA A3,A,68,20,A3,A,8A.D0
560 DATA 12,A0,A,A9,20,20,A3.A
570 DATA 88,D0,FA,60,A9,A,20.A3
580 DATA A,A9,D,48,A9,1,20.EE
590 DATA FF,68,4C,EE,FF,A9.BF,8D
600 DATA 20,2,A9,A,8D,21,2.A9
610 DATA E,A2,2,20,F4,FF,60.8
620 DATA 48,8A,48,98,48,C0.0.F0
630 DATA 7,68,A8,68,AA,68.28.60
640 DATA 20,0,9,68,A8,68,AA.68
650 DATA 28,60,0,0,A9,EE,8D.20
```

B.B.C.

```
  660 DATA 2,A9,A,8D,21,2,A9.E
  6700NERRORRUN
  680INPUT'"START ADDRESS OF SCREENDUMP"
,A$:startdump=EVALA$
  690INPUT"FINISH ADDRESS OF SCREENDUMP"
,B$:findump=EVALB$
  700INPUT"EXECUTION ADDRESS OF SCREENDU
MP",C$:dump=EVALC$
  710FORI=0TO2STEP2
  720P%=findump+1
  730;OPTI
  740.init
  750LDA#start MOD 256:STA&220
  760LDA#start DIV 256:STA&221
  770\ put address of code into the even
t vector
  780LDA#14:LDX#2:JSR&FFF4
  790\ *FX14,2 switch on keyboard event
  800RTS
  810.start
  820PHP:PHA:TXA:PHA:TYA:PHA
  830CPY#0:BEQ calldump
  840\ if CTRL @ pressed go to calldump
else finish
  850PLA:TAY:PLA:TAX:PLA:PLP:RTS
  860.calldump
  870JSR dump
  880PLA:TAY:PLA:TAX:PLA:PLP:RTS
  890\ CALL SCREENDUMP
  900¿
  910NEXT
  920PRINT'"CODE ASSEMBLED"'
  930PRINT"*LOAD YOUR ORIGINAL SCREENDUM
P"
  940PRINT"THEN"'"*SAVE SCREENDUMP ";STR
$~startdump;" ";STR$~P%;" ";STR$~init
  950PRINT'"WHEN YOU WANT TO USE THE DUM
P, *RUN IT  AND THEN PRESS CTRL @ TO EXE
CUTE IT AT  ANY TIME"
```

B.B.C.

CHAIN

If you have ever thought that typing in CHAIN "name" or CH. "name", to run a Basic program, is tedious, the following program should make things a little easier, for disk users at least. Simply typing *R name (no quotes) will chain the program. The routine works by using the OSARGS operating system command with the a 1 in the accumulator. This returns the address of the rest of the command line which is then pushed into the keyboard buffer along with CHAIN and quotes, to give CHAIN "name .

Once the program is run, it will assemble the code and save the file R to disk. Once there it is accessed with the *RUN option and omitting the RUN.

```
 10DIM PROG 300
 20DIM BUFF 8
 30BUFF=&70
 40FOR T%=0 TO 3 STEP 3
 50PROG=&A00
 60P%=PROG
 70[.PROG OPT T%
 80LDA#1:LDY#0:LDX#&70:JSR&FFDA;GET LINE
 90LDX#0
 95JMP K1
100]
110$P%="CHAIN"
120?(P%+5)=34
130P%=P%+7
140[.K1 OPT T%
150LDA P%-7,X
160STX&80:LDX#0:TAY:LDA#138:JSR&FFF4
170LDX&80:INX:CPX#6:BNE K1
180LDY#0:.K2 LDA(&70),Y:CMP#&0D:BEQ K3:STY&80
190LDX#0:TAY:LDA#138:JSR&FFF4
200LDY&80:INY:JMP K2
210.K3 LDY#34:LDX#0:LDA#138:JSR&FFF4
220LDY#&0D:LDX#0:LDA#138:JSR&FFF4
230RTS
240]
250NEXT
260 *SAVE R A00+54 A00
```

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